THE IRON TRADE REVIEW

Volume XLV | CLEVELAND, JULY 1, 1909 | Number 1

MORE CAR ORDERS

PLACED AND STILL OTHERS WILL BE SOON.

Mills Refuse to Extend Contracts—Sharp Advance in Southern Iron Due Largely to Speculation.

Even the intense heat of the past few days has not checked the activity of mills and furnaces, and the first half of the year closes with most satisfactory conditions. While one can not speak with absolute assurance concerning the last half of this year and the first half of next until crop prospects are more definitely defined, crops are now in good condition and if their progress continues, great prosperity for the iron business seems to be assured. The only cloud in the sky is due to labor troubles, but the strike on the Great Lakes against the open shop principle is rapidly collapsing, and it is likely that the same result will follow the strike which has just been declared against the open shop principle in sheet and tin plate mills. The mill controversy may, however, be prolonged.

Railroad Buying

Some people, more noted for their pessimism than for their bustling ability in collecting news, have been asserting that the recent news published in these columns in regard to car orders has been grossly exaggerated. The fact remains, however, that the extensive buying movement which we have outlined will be carried out, and probably many more cars will be ordered than have been reported. From all parts of the country comes most encouraging news concerning the plans for buying of railroad equipment. One large system expects to destroy many of its old cars and to bring its entire equipment up to a much higher standard of excellence. The Harriman lines have purchased 5,200 cars, dividing the order between the Pressed Steel Car Co., the Standard Steel Car Co., and the American Car & Foundry Co.; the Alabama Great Northern awarded a contract for 500 cars to the Standard Steel Car Co., and 250 to the Pressed Steel Car Co.; the C., B. & Q. is in the market for 500 freight cars, and the Buffalo, Rochester & Pittsburg for 1,000 freight cars; the Ann Arbor railroad has ordered 1,400 tons of structural steel, and is reported in the market for 12,000 tons additional.

Pig Iron Conditions

The most important transaction in pig iron is the purchase of 25,000 tons of Bessemer by the Jones & Laughlin Steel Co. As this purchase indicates that the large accumulations made by the company during the period of depression are vanishing, it is received as an indication of sound conditions. The foundry pig iron market is quiet throughout the country, with the exception of the southern product, on which prices have been advanced by some sellers to $12.25 Birmingham, and by others to $12.50. These changes seem to be due largely to speculation.

Structural Material

On structural material fabr ating prices are not so irregular. It is expected that the only interest now quoting 1.30c Pittsburg on shapes will advance to 1.35c, and take similar action on plates. Some jobbers have advanced their quotations on plates, shapes and bars from stock $1 per ton, but one jobber declined to place an order for steel bars at 1.25c for delivery during the first half of next year. The offer to sell at this price to the jobber was made by an independent concern. The demand for open-hearth billets in the Pittsburg district is greater than the supply, and premiums are being obtained. One of the strongest features of the present situation is the action which has been taken by all the mill agencies in canceling contracts not fully specified up to July 1.

LABOR QUESTION

BECOMES IMPORTANT FACTOR IN MARKETS.

Western Bar Iron Association Agrees to Scale—Republic Co. Out for Open Shop.

The expiration this week of the annual wage scale agreements of the manufacturers with the Amalgamated Association of Iron, Steel and Tin Workers, has brought to a definite form the controversies with organized labor which have been a source of disturbance recently in the iron and steel market. Starting Wednesday midnight, the workmen are striking the open shop order of the American Sheet & Tin Plate Co. in the 14 union mills of the company. The strike question had been passed upon in the respective locals of the union which were affected by the declaration and the majority had voted to ratify the action of their delegate representatives in deciding for resistance at the convention in Pittsburg several weeks ago. The union mills of the American Sheet & Tin Plate Co. which are involved in the strike are these:

Tin Plate.—American, Elwood City, Ind., 28 mills; Anderson, Anderson, Ind., 8 mills; Humbert, Connellsville, Pa., 6 mills; La Belle, Wheeling, W. Va., 10 mills; Laughlin, Martin's Ferry, O., 23 mills; Greer, New Castle, Pa., 20 mills; Sharon, Sharon, Pa., 20 mills; Shenango, New Castle, Pa., 30 mills; Morewood, Gas City, Ind., 8 mills. Total, 9 plants and 152 mills. Of these plants, Anderson, Humbert and Morewood, with 21 mills, have been idle.

Sheets.—Aetna Standard, Bridgeport, O., 23 mills;; Guernsey, Cambridge, O., 11 mills; Midland, Muncie, Ind., 7 mills; Piqua, Piqua, O., 4 mills; Struthers, Struthers, O., 6 mills. Total, 5 plants with 51 mills. Of these plants, Midland and Struthers with 13 mills, have been idle.

On the bar scale, the Republic Iron & Steel Co. has notified the Amalgamated association that it desires to run its two steel bar mills at

(Continued on page 11.)

THE WEEK IN IRON CENTERS

PITTSBURG.

Large Block of Bessemer Sold—Satisfactory Close of First Half of Year.

Office of THE IRON TRADE REVIEW,
510 Park Building, June 29.

The mid-year finds the iron and steel industry in an improved and favorable position. The mills have accumulated a large tonnage upon their books in practically all products with the exception of rails and a better movement is under way in this latter market, which thus far has not extended much beyond the western mills. Current ordering and new business are in a satisfactory volume, as is evidenced by the increased tonnage entered in some lines in June over May, which up to this time had more closely approached normal figures of production than any other month in almost two years. Heavy orders were sent in June to the mills for steel bars and sheets while in semi-finished steel exceptionally good records were made. The bookings of the Carnegie Steel Co. in its rail and billet department exceeded May by about 35,000 tons, most of which was for shipments to manufacturing consumers of steel.

Reduced prices have played a strong part in bringing the general market and the operations of the mills to their present scale of activity. These have brought out a persistent ordering movement from buyers which has backed up a large tonnage on mill books, so that producers are now acting more independently in taking additional business. This finds illustration in the attitude of the mills in declining to extend at booked prices, the contracts expiring July 1 wherein the consumer had not strictly conformed to his promises as to specifying for material within the designated period.

The labor situation presents an element of disturbance. The open shop declaration of the American Sheet & Tin Plate Co. is effective with the expiration of the present agreement with the Amalgamated Association of Iron, Steel & Tin Workers at midnight June 30 and the men are striking the order, having voted upon this proposition in their respective locals. The Republic Iron & Steel Co. has asked for the open shop in its two steel finishing mills. This week the company is closing all its plants for its annual inventory-taking and the length of its suspension will depend upon the outcome of its open shop proposition made to the Amalgamated. The bar iron scale for the year beginning July 1 has been amicably adjusted on practically the same basis as had prevailed during the past year. This agreement was reached at a conference between the representatives of the union and the Western Bar Iron Association at Cambridge Springs, Pa., last week.

Pig Iron.—The Jones & Laughlin Steel Co. during the past week bought a block of 25,000 tons of standard Bessemer pig iron for third quarter delivery at $15.25 valley furnace, or $16.15 delivered. The iron will be furnished by the Bessemer Pig Iron Association. This is one of the most important lots of Bessemer iron to be sold in the Pittsburg district in the past two years. During the greater part of the depression, the Jones & Laughlin company ran its six furnaces full and piled a large stock of iron, as in normal times the steel works and finishing mill needs of the company are considerably in excess of its pig iron capacity. The company is expecting to have its new furnaces at Aliquippa on a producing basis toward the latter part of the year and the fact that it finds it necessary to enter the market for iron at this time indicates its heavy melt and is interpreted favorably by the trade. The company is now running its works full. The Algoma Steel Co. has also bought 5,000 tons of Bessemer for prompt shipment and this will be made by a Canadian furnace on account of the freight advantage.

Besides the Jones & Laughlin sale, there have been no transactions of importance in this district although reports are that a middleman is offering to take on a large tonnage of basic for last quarter at an advanced price. The market is rather quiet, although prices are very firm and predictions are being freely made that steel making iron will be at a considerably higher level by fall. Inventory taking is having some effect at this time in keeping buying within moderate limits.

The general price on foundry iron remains $15 furnace for No. 2 though some furnaces are quoting up to $15.50. Malleable and basic are also quoted at a minimum of $15 valley. Bessemer is held at from $15.25 to $15.50 valley. A sale of 100 tons of chill cast iron for prompt shipment was made at the latter figure. Forge is from $14 to $14.25 valley.

In addition to the Alice and Sharpsville stacks which will soon resume on Bessemer as reported, the Claire furnace is preparing to blow in. With these furnaces going, there will be 12 out of 17 stacks in the Mahoning and Shenango valleys in operation.

One of the large southern sellers has advanced its price on No. 2 to $12.50 Birmingham for any delivery, but has taken on no orders at this level. It is reported that two southern interests which have been aggressive in the market have withdrawn from active competition.

On prompt and third quarter shipment on northern iron, we quote as follows:

Bessemer, valley	$15.25 to 15.50
Bessemer, Pittsburg	16.15 to 16.40
No. 2 foundry, Pittsburg	15.90 to 16.40
Gray forge, Pittsburg	14.90 to 15.15
Basic, valley	15.00 to 15.25
Basic, Pittsburg	15.90 to 16.15

Ferro-Alloys.—A fairly active demand for ferro-alloys is current. Some uncertainty has arisen in the market by reason of doubt as to the tariff and sales of foreign material are being made with duty to the account of buyer. Users of ferro-manganese have been closing for their requirements quite freely. A Buffalo interest bought about 500 tons in addition to several hundred tons of 11 per cent ferro-silicon at about the quoted figures. Though low sales have recently been made in the different alloys, the market appears firmer. We quote ferro-manganese at from $42 to $43 Baltimore for prompt or forward delivery with a freight rate of $1.95 to Pittsburg.

Fifty per cent ferro-silicon is quoted at $62.50 to $63.50 Pittsburg on forward deliveries, at present duty; domestic, 12 per cent, $25; 11 per cent, $24; 10 per cent, $23 Pittsburg.

Plates.—The Interborough Transit Co. of New York has closed for 150 steel subway and 100 steel elevated coaches. Of the subway coaches, the American Car & Foundry Co. will furnish 110 and the Standard Steel Car Co. 40. Of the coaches for the elevated, the Barney & Smith Car Co. will supply 40 motor cars, the Jewitt Car Co., 20 motor cars, the St. Louis Car Co.. 20 trailers and the Wasson Mfg. Co., 20 trailers. The steel for these cars will be furnished by the Carnegie Steel Co., Jones & Laughlin Steel Co. and other interests. The Carnegie Steel Co. will roll the shapes and plates, 9,500 tons, for the new

steel lake freighters recently ordered by the Pittsburg Steamship Co. Some grades of plates which have not been especially active are showing considerable improvement, and the mills are entering a larger tonnage which is derived from recent car orders, from large sized pipe line contracts and from other sources. There is little doing in riveted pipe work, but tank steel is improving. The regularly quoted prices in plates are from 1.30c to 1.35c, but it is reported the former prices may be shaded with some mills. On the other hand, it is understood that the Carnegie Steel Co., which is selling at 1.30c, will soon advance to 1.35c, the price asked by a number of independents. We quote the present market as follows:

Tank plates, ¼-inch thick, 6¼ to 100 inches, 1.25c to 1.35c mill. Extras are as follows per 100 pounds: Boiler and flange steel plate, 0.10c; A. B. M. A. and ordinary firebox steel plates, 0.20c; still bottom steel, 0.30c; marine steel, 0.40c; locomotive firebox steel, 0.50c; all sketches, excepting straight taper plates varying not more than 4 inches in width at ends, narrowest end not being less than 30 inches, 0.10c; circles, 0.20c. Plates in widths over 100 inches up to 110 inches, 0.05c; over 110 inches up to 115 inches, 0.10c; over 115 inches up to 120 inches, 0.15c; over 120 inches up to 125 inches, 0.25c; over 125 inches up to 130 inches, 0.50c; over 130 inches, 1c. Gages under ½-inch to and including 3/16-inch plate on thin edges, 0.10c; under 3/16 to and including No. 9, 0.25c. Five cents extra for less than carloads. Terms, net cash in 30 days.

Sheets.—A gradual improvement in the tonnage of sheet orders sent to the mills is being noted. The shipments of the American Sheet & Tin Plate Co. have been very heavy in June and bid fair to surpass those of any month since the depression. Some of the freer specifying of consumers is undoubtedly due to the fear of labor disturbances. Sheet prices continue to harden and concessions are no longer so apparent. The leading interest this week put on several additional idle mills and increased its sheet mill operations to 76 per cent of capacity. The independents are working at about 80 per cent. We quote present minimum prices, which are subject to some shading, as follows:

Blue annealed sheets, Nos. 10 and heavier, 1.60c; Nos. 11 and 12, 1.65c; Nos. 13 and 14, 1.70c; Nos. 15 and 16, 1.80c; box annealed sheets, Nos. 10 to 12, 1.85c; Nos. 13 and 14, 1.90c; Nos. 15 and 16, 1.95c; Nos. 17 to 21, 2c; Nos. 22 to 24, 2.05c; Nos. 25 and 26, 2.10c; No. 27, 2.15c; No. 28, 2.20c; No. 29, 2.25c; No. 30, 2.35c; galvanized sheets, Nos. 13 and 14, 2.25c; Nos. 15 and 16, 2.40c; Nos. 17 to 21, 2.50c; Nos. 22 to 24, 2.65c; Nos. 25 and 26, 2.85c; No. 27, 3.05c; No. 28, 3.25c; No. 29, 3.40c; No. 30, 3.65c; painted roofing sheets, $1.55 per square for No. 28 gage, 2½-inch corrugation, and galvanized roofing sheets, $2.80 per square for No. 28 gage, 2½-inch corrugation.

Tin Plate.—The strike of the Amalgamated Association of Iron, Steel and Tin Workers against the open shop order of the American Sheet & Tin Plate Co. in its nine union plants, is scheduled to begin at midnight, June 30, when the present wage agreement expires. The plants affected are the American, Anderson, Humbert, La Belle, Laughlin, Greer, Sharon, Shenango and Morewood, with a total of 152 mills. Votes have been taken among the men in the different active union works ad the majorities have favored the strike. Representatives of the union indpendent sheet and tin mills are meeting with the officers of the Amalgamated Association in this city today to determine their position in the impending strike. In anticipation of interrupted mill operations, consumers of tin plate have been ordering very heavily during June, and both the American Sheet & Tin Plate Co. and independents report a very heavy tonnage entered. From this fact it is expected that shipping instructions in July will be comparatively light. Tin plate prices are regular and we quote the present market as follows:

Coke tin plate, 100-pound basis, 14 x 20, $3.45 f. o. b. mill Pittsburg district and $3.40 in large lots. Terms 30 days less 2 per cent for cash in 10 days.

Rails and Track Material.—It has not been definitely settled whether the 49,000 tons of open-hearth rails ordered by Argentine Republic from the United States Steel Corporation will be rolled at Ensley or in this district. In case this tonnage comes to the Carnegie Steel Co., it is very probable that some of it at least will go to the Ohio Works, Youngstown, where the recent completion of open-hearth furnaces enables this plant to roll rails of this grade upon its combination billet and rail mill without shipping in the open-hearth blooms. The Edgar Thomson works have no open-hearth steel capacity, and when such rails are manufactured there, the blooms are obtained from other works. The rail situation continues to improve and the outlook for contracts for the eastern mills is more promising. Light rail bookings are good, the entries of the Carnegie Steel Co. the past week aggregating 2,400 tons. There is a very fair business in spikes. We quote the market on Bessemer rails as follows, the price on open-hearth rails being $30 mill:

Fifty-pound and heavier, 500-ton and over, $28; carloads and less than 500 tons, $30; less than carload lots, $32; light rails in lots up to 250 tons, 8-pound, $29; 12-pound, $28; 16 to 25-pound, $27; 30 to 35-pound, $26.75; 40 to 45-pound, $26; on lots over 250 tons, prices are 60c less, and over 500 tons, $1 less; angle splice bars for standard sections, 1.50c Pittsburg; standard spikes, 1.55c to 1.70c Pittsburg; hand spikes, 1.55c to 1.70c Pittsburg.

Steel.—The orders entered by the Carnegie Steel Co. in its rail and billet department during June will be about 35,000 tons in excess of those in May, which was the best in many months. Semi-finished steel specifications furnished the greater part of this tonnage, thereby favorably reflecting the manufacturing activity of consumers. Makers of semi-finished steel generally, including the Republic Iron & Steel Co., the Lackawanna Steel Co. and the Jones & Laughlin Steel Co., are reluctant to sell much additional material at this time on account of their finishing mill demands and the well-filled condition of their order books. Difficulty especially is encountered in obtaining open-hearth steel, which is commanding premiums over the nominal price. Bessemer steel is gradually getting stronger. Sheet bars are firm.

Bessemer 4 x 4 billets with 0.25 carbon and less are regularly quoted at $23 Pittsburg, with the usual extras for size and analysis, and open-hearth rolling billets from $23 to $25 Pittsburg. Forging billets range from $25 to $27 Pittsburg. The regular quotation on sheet and tin bars is $25 Pittsburg. Steel makers divide with consumers the freight within the $1 limit, making the price in such territory $23.50 to $25.50 delivered on billets, and $25.50 delivered on sheet bars.

Hoops and Bands.—Business in hoops is showing some improvement and prices are less irregular, being governed largely by the attractiveness of the specifications offered. There is a somewhat more active ordering movement. We quote the present market as follows:

Hoops in carload lots, 1.50c; in less than carload lots, 1.60c; bands, 1.20c,

base half extras as per standard steel.

Merchant Bars.—Specifications for steel bars received in June aggregated a larger total than in May, which was the best month since the depression. All the bar mills of the leading interests in this district are running full, the Carnegie Steel Co. having recently increased the operations of its Greenville plant. Deliveries are becoming more retarded and range from two to five weeks, according to specified size. The minimum price on steel bars remains 1.20c, although many of the important interests are quoting 1.25c Pittsburg, to which quotation the leading interest will soon advance. Bar iron is improving, the tonnage entered in the past week, particularly in the west, having increased. The plants of the Republic Iron & Steel Co. will close this week for their annual inventory, the union mills shutting down Wednesday at midnight upon the expiration of the present agreement with the Amalgamated Association, while the other mills will continue running until Saturday. The period of idleness of the union mills will be contingent upon the negotiations with the Amalgamated Association, while the non-union plants will resume as quickly as possible, as the company is getting behind on orders. Shafting shows more activity and prices are a little better. We quote the present market as follows:

Common iron bars, 1.40c to 1.45c, Pittsburg; Bessemer and open-hearth steel bars, 1.20c to 1.25c; plow and cultivator, 1.20c to 1.25c; channels, angles, zees, tees, under 3-inch, 1.30c, all f. o. b. mill. The following differentials are maintained on steel: Less than 2,000 pounds, 0.10c advance; less than 1,000 pounds of a size, 0.30c advance. Cold rolled and ground shafting, 60 per cent in carloads, and 55 per cent in less than carloads, delivered in base territory. Planished and machine straightened tire is 1.40c base; iron finished tire under 1½ by 1½ inches, 1.35c, both plus ½ extra on tire card; iron finished tire, 1½ x ½ and over, 1.20c, plus ½ extra on the steel bar card.

On cold rolled strip steel, width 1½ inches and wider, and 0.100 inch and thicker, we quote base prices for 100 pounds, $3.05 on hard, and $3.30 on soft.

Structural Material. — Bookings in June were not as heavy as in May. Those of the leading interest were about two-thirds of the tonnage of the previous month. Some of the shape mills are not so active as they have been, but others report very favorable demands for material being made upon them. There is little change in the general situation, as the inquiry is only fair and some low fabricating prices are still in sight. The Jones & Laughlin Steel Co. is fabricating in its own shops about 3,000 tons for the buildings for its new tin mill at Aliquippa, and has awarded to the Fort Pitt Bridge Works a pit furnace building which will require about 400 tons. The bids for the new bridge across the Ohio river at Sewickley, Pa., 5,000 tons, closed this week. Figures have been taken for new buildings for the Ford Motor Co. at Detroit, 1,000 tons; a warehouse for W. H. Granger & Co., Buffalo, 500 tons, and a building for the Buffalo Realty Co., Buffalo, 350 tons. We quote the present market on structural shapes as follows:

Beams and channels, 15-inch and under, 1.30c to 1.35c; over 15 inches, 1.40c to 1.45c; zees, 1.30c to 1.35c; tees, 1.30c to 1.35c; angles, from 3 to 6 inches, 1.30c to 1.35c; over 6 inches, 1.40c to 1.45c; universal and sheared plates, 6¼ inches wide and wider, 1.30c to 1.35c.

Merchant Pipe.—The mills are filled up for an extended period on large size line pipe, and it is probable that some of the extensive projects still in the market may be delayed through difficulty in obtaining deliveries. No announcement of expected changes in steel pipe prices has been made and the market is hardening. Several large manufacturing interests in this district have either closed or are negotiating for their merchant pipe requirements over the remainder of the year. The Philadelphia Co. is in the market for 30 miles of iron gas line of miscellaneous sizes and eight miles of 20-inch steel line. We quote the following official discounts on merchant pipe, subject to an additional one point and five off to jobbers:

	—Steel—		—Iron—	
	Black.	Galv.	Black.	Galv.
⅛ and ¼ inch.....	72	56	69	..
⅜ inch	73	59	70	56
½ inch	76	64	73	61
¾ to 6 inch.....	80	70	77	67
7 to 12 inch.....	75	60	72	57
PLUGGED AND REAMED.				
1 to 4 inch.....	78	68	75	65
EXTRA STRONG PLAIN ENDS.				
⅛ to ⅜ inch.....	65	53	62	50
½ to 4 inch.....	72	60	59	57
4½ to 8 inch.....	68	56	65	53
DOUBLE EXTRA STRONG PLAIN ENDS.				
½ to 8 inch.....	61	50	58	47

Boiler Tubes.—There is no marked improvement to be noted in the tube market. Some of the iron tube mills have, however, booked considerable business and are in a comfortable position. Tube prices are not firm. We quote the following official discounts on lap-welded steel boiler tubes to jobbers in carloads:

1 to 1½ inch.....	50
1¾ to 2¼ inch.....	62
2½ inch	64
2¾ to 5 inch.....	70
6 to 13 inch	62

2½ inch and smaller, over 18 feet, 10 per cent net extra.
2¾ inch and larger, over 22 feet, 10 per cent net extra.
To destinations east of the Mississippi river will be sold at delivered discount for carloads lowered by two points, for lengths 22 feet and under; longer lenghts, f. o. b. Pittsburg.

We quote the following official discounts on charcoal iron tubes to jobbers:

1 to 1½ inch.....	45
1¾ to 2¼ inch.....	45
2½ inch	50
2¾ to 5 inch	57
6 to 13 inch.....	45

Wire Products.—The wire companies are regularly booking new contracts on the present price basis for delivery up to Sept. 1, and are shipping from the heavy accumulation of orders entered at the $1.60 wire nail basis in May. The mills are unwilling to contract for extended shipment and higher prices are generally expected soon. Prompt deliveries are not so easily obtained. We quote the present market on wire products as follows:

Wire nails, jobbers' carload lots, $1.70; retailers' carload lots, $1.75; painted barb wire, jobbers' carload lots, $1.70; retailers' carload lots, $1.75, with 30c for galvanizing; plain wire to jobbers in carloads, $1.50, and to retailers in carloads, $1.55; polished staples, $1.70; galvanized staples, $2.

Wire Rods.—Most of the important consumers of wire rods covered against their requirements at the former low prices and are now specifying for their current needs. We quote present prices at $28 to $29 Pittsburg on Bessemer and $29 to $30 Pittsburg on open-hearth rods.

Coke.—A Shenango valley furnace interest about to resume operations has closed a contract for 5,500 tons of coke monthly over a period of 3½ years. This settlement is arranged by a sliding scale based upon the price of Bessemer iron. The Jamison Coal & Coke Co. has closed with an eastern furnace for 5,000 tons monthly for practically a year, beginning July 1, at $1.75 ovens to Jan. 1, and $1.95 ovens for deliveries thereafter. Some of the foundries are specifying more freely and are showing evidence of an increased melt. The general coke market is not especially active. We quote spot furnace coke at from $1.50 to $1.60 ovens, and on contract from $1.60 to $1.70 ovens, according to grade. On first class Connellsville foundry coke, the range is from $1.80 to $2 ovens from prompt shipment, and on contract from $1.90 to $2.25 ovens. The *Courier's* figures for the week ending June 19 show 28,069 ovens active with an output of 307,014 tons, compared with 27,770 active

ovens and a production of 299,486 tons the previous week.

Old Material. — The old material market is running along quietly, as neither mills nor foundries are taking on much tonnage. In heavy steel the steel makers are well covered for their immediate needs and are showing little interest, but the dealers continue bullish and are making light offerings. Little material is being offered for sale. The mills, which are sellers of low phosphorus scrap, are asking higher prices, but one interest recently disposed of a fair-sized lot. The Pennsylvania lines west will close this week on 800 tons of steel, 1,800 tons of long rails, and 650 tons of wrought. We quote gross tons delivered in the Pittsburg district as follows:

Heavy melting scrap, $15.50 to $16; re-rolling rails, $15.75 to $16.25; bundled sheet scrap, $13 to $13.50; iron axles, $21 to $22; old iron rails, $18 to $18.50; No. 1 wrought scrap, $15.50 to $16; old car wheels, $15.50 to $16; low phosphorus, $19 to $20; machine shop turnings, $11.50 to $12; cast borings, $9.50 to $10; No. 1 cast scrap, $15 to $15.50; malleable, $15 to $15.50; stove plate, $11.50 to $12.

CHICAGO.

Contracts Expiring at End of Half Year Will Not be Extended.

Office of THE IRON TRADE REVIEW,
1328 Monadnock Block, June 29.

No better evidence is needed of the sharp recovery in iron and steel than the action decided upon by several large finishing mills with reference to uncompleted contracts expiring June 30. No specifications will be received against these contracts after Wednesday of this week, and they will be peremptorily cancelled on that date. What tonnage this action will remove from order books is problematical, but as most of them were placed at the low figures of the year it was to be expected that buyers speculated more or less on their requirements, and that some good sized gaps will exist July 1. There is, however, ample tonnage in hand and in sight to more than offset this difference and continued operation of all the plants in this territory is assured throughout the summer months. Most of the mills are on double turn, with no intention of departing therefrom. Local jobbers advanced their prices on plates, structural and bars from stock $1 a ton last week, and southern and northern furnaces also marked up their brands 50 cents a ton. Billets are selling from 50 cents to $1 a ton higher than a week ago; bar iron is firmly established at a minimum of 1.35c Chicago, and hard steel angles at a minimum of 1.30c. Premiums are asked on forward deliveries of fencing and smooth wire and on blue annealed sheets. The market is very strong in all departments, and even on fabricated material prices are steadily rising. The Harriman lines have purchased 5,200 cars, dividing the order between the Pressed Steel Car Co., Standard Steel Car Co. and American Car & Foundry Co. Railroad buying is of excellent volume. The St. Paul System contracted for 1,900 tons of structural steel last week, and is reported in the market for 12,000 tons additional. The Santa Fe ordered 10,000 tons of tie plates, and the Northern Pacific is asking prices on 1,000 tons. Contracts for 4,000 tons of cast iron pipe also were let. The prospect of a strike July 1 in the sheet, tin plate and bar iron mills is causing some uneasiness here and has led to heavy specifications for all these materials.

Pig Iron.—Scarcely half the producing capacity of the south is in the market to sell iron at the present time. The latest and most conspicuous interest to withdraw is the Tennessee Coal, Iron & R. R. Co., and its passing simultaneously marked the abandonment of the $11.50 schedule. Alabama irons are now firmly entrenched on the basis of $12 Birmingham for No. 2 foundry, with but a limited tonnaage offered for sale. Even those furnaces remaining in the market insist that all inquiries shall first be submitted to the home office before any action is taken on them. The Republic Iron & Steel Co. is out of the market entirely for the third quarter and is asking $12.25 for the last three months of the year. The week past has seen some fair sized tonnages placed for northern irons, several lots being for 1,000 tons and over, and one inquiry is out for 10,000 tons; but commitments for southern brands are of a dribbling nature. The western foundrymen very generally covered for their southern requirements for the third quarter when prices were around $11 and for the next couple of months a quiet demand for these brands is expected. The northern furnaces, however, have come into their own again, at least for the third quarter. The maximum price for this delivery is still $16 furnace, which gives them a slight advantage over southern furnaces. For the fourth quarter, they are asking $16.50 furnace for No. 2, and $16.25 if the order runs through the entire six months. There is no change in Lake Superior charcoal. We quote for Chicago delivery as follows:

Lake Superior charcoal	$19.50 to 20.00
Northern foundry No. 1	17.00 to 17.50
Northern foundry No. 2	16.50 to 17.00
Northern foundry No. 3	16.00 to 16.50
Southern foundry No. 1	16.85
Southern foundry No. 2	16.35
Southern foundry No. 3	15.85
Southern foundry No. 4	15.35
Southern No. 1 soft	16.85
Southern No. 2 soft	16.35
Southern gray forge	14.85
Southern mottled	14.60
Southern silveries, 4 per cent silicon	17.35 to 17.85
Southern silveries, 5 per cent silicon	17.85 to 18.35
Southern silveries, 6 per cent silicon	18.85 to 19.85
Jackson Co. silveries, 6 per cent	19.90
Jackson Co. silveries, 8 per cent	20.90
Jackson Co. silveries, 10 per cent	21.90
Malleable Bessemer	16.50 to 17.00
Standard Bessemer	17.65 to 17.90
Alabama basic	16.85

Billets.—A very strong market exists on all forms of intermediate steel. Specifications are to full contract requirements and there is a plentiful supply of new business. Mills, however, are very cautious in adding to their obligations. The leading interest has quoted $27 Chicago on an inquiry for 1,000 tons of forging billets, an advance of $1 a ton over the quotation of the preceding week. The general market is considered from $26.50 to $27 base for forging billets, and $24.50 to $25 Chicago for rolling billets.

Merchant Bars.—The labor situation in the mills controlled by the Amalgamated Association looms up largely in this week's consideration of the market. The Western Bar Iron Association signed the scale last week, but no conference has been held as yet with the Republic Iron & Steel Co. The Amalgamated Association, it is reported, has declined to entertain the company's proposition to omit the Sylvan mill at Moline, Ill., and the Brown-Bonnell mills at Youngstown, O., from the negotiations this year, thus declaring them open, and a strike at all the company's plants is in prospect unless an agreement is reached before Wednesday night, when the present agreement expires. This condition of affairs has resulted in an appreciable strengthening of the market. Bar iron is held firmly at a minimum of 1.35c Chicago, and for deliveries 60 days hence, from 50 cents to $1 a ton higher is asked. Specifications are very active and new tonnage is in satisfactory volume. Although a lessening in demand for steel bars is usually noticeable at this time of the year, none is yet apparent. Thirty days is the very best delivery obtainable from western mills, and this is none too sure. All the local jobbers have advanced prices from stock $1 a ton. We quote as follows:

Bar iron, 1.35c to 1.40c; hard steel bars, 1.25c to 1.30c; soft steel bars

and bands, 1.38c, half extras; soft steel angles, less than 3 x 3, 1.48c; hoops, 1.78c base, full extras, planished or smooth finished tire steel, 1.58c; iron finish, up to 1½ x ½-inch, 1.53c base tire card; iron finish, 1½ x ½-inch and larger, 1.38c base steel card; channel for solid rubber tire, ¾ to 1 inch, 1.88c, and 1⅛-inch and larger, 1.78c; smooth-finished machinery steel, 1.63c; flat sleigh shoe, 1.43c; concave and convex sleigh shoe, 1.63c; cutter shoe, 2.75c; toe calk steel, 1.93c; railway spring steel, 1.78c, base vehicle card; crucible 1.73c, base steel card; vehicle spring tool steel, 7c to 9c, with higher prices asked on special grades. Quotations on shafting are 60 per cent off the list for carload lots, and 55 per cent off for less than carload lots, carload freight allowed to points in base territory. On iron and steel bars from local stocks, we quote as follows: Bar iron, 1.70c to 1.80c, full extras; soft steel bars, 1.60c per 100 pounds base, plus ½ extras; soft steel hoops, 2.20c, full extras.

Plates.—No cessation is apparent in the demand for material, either from mill or store. Jobbers have advanced their prices $1 a ton, and so strong is the mill situation that all uncompleted contracts expiring June 30 will be canceled on that date. It is stated positively that no extensions will be allowed, and it is noteworthy also that no requests are being made by mills for specifications on these unfinished contracts, although the expiration date is only three days hence.

For mill prices see Pittsburg report. Freight to Chicago, 18 cents. We quote for shipment from local stocks as follows:

Tank steel, ¼-inch and heavier, up to 72 inches wide, 1.70c; from 72 inches wide to 96 inches wide, 1.80c; 3/16-inch up to and including 60 inches wide, 1.80c to 1.85c; 72 inches wide, 2.05c to 2.10c; No. 8 up to 60 inches wide, 1.80c to 1.85c. Flange and head quality, 25c extra.

Sheets.—The best delivery from local mills on box annealed sheets is five to six weeks; on blue annealed sheets, six to seven weeks, and on galvanized sheets five to six weeks. Concessions are still heard of, ranging from 50 cents to $1.00 a ton, but the sources from which they are obtainable are rapidly diminishing. New business and specifications continue excellent. Railroad bookings for car roofing material are of increasing volume.

For mill prices, see Pittsburg report. Freight to Chicago, 18 cents. We quote store prices at Chicago as follows:

No. 10, 2c to 2.10c; No. 12, 2.05c to 2.15c; No. 14, 2.10c to 2.20c; No. 16, 2.20c to 2.30c; Nos. 18-20, 2.50c to 2.55c; Nos. 22-24, 2.55c to 2.60c; No. 26, 2.60c to 2.65c; No. 27, 2.65c to 2.70c; No. 28, 2.75c to 2.80c; No. 30, 3.05c; galvanized sheets, Nos. 10 to 16, 3c to 3.10c; Nos. 18 and 20, 3.05c to 3.15c; Nos. 22 to 24, 3.20c to 3.25c; No. 26, 3.40c to 3.45c; No. 27, 3.60c to 3.65c; No. 28, 3.80c to 3.90c; No. 30, 4.20c to 4.50c.

Structural Steel.—A striking example of the excellent conditions prevailing is the attitude mills have taken on all contracts expiring June 30 on which complete specifications have not been received. In the past it has been customary to extend these, but so voluminous has been business of late that all these contracts will be cancelled Wednesday and no specification will be received against them after that date. The situation with regard to fabricated material is also growing better daily. Specifications are increasing and prices are strengthening. It is more than likely that an open market will exist for the remainder of the year, but, despite this, prices are from $5 to $10 higher than a month ago. Fabricators are no longer making concessions to secure business; the reverse is more likely true today. Local jobbers advanced store prices $1 a ton last week. The C., M. & St. P. Ry. has let contracts for an aggregate of 1,500 tons of steel, divided as follows: McClintic-Marshall Construction Co., the North Fork viaduct, Idaho, 500 tons, and the Rest Creek viaduct, 400 tons; and to the Minneapolis Steel & Machinery Co., 505 tons of girder spans. The same railroad is reported in the market for 12,000 tons of bridge material. The Llewellyn Iron Works, Los Angeles, Cal., secured the contract for the Las Vegas (Nev.) shops, 500 tons, of the Salt Lake, San Pedro & Los Angeles Railway, and the American Bridge Co. secured the contracts for the White building, San Francisco, 390 tons, and the Spreckels theater, same city, 788 tons. The Chicago & North-Western Railway divided its order for 724 tons of bridge material between the Worden-Allen Structural Co., of Milwaukee, and the Modern Structural Steel Co., Waukesha. Figures have been asked on the Wall Street viaduct, Sioux City, 1,500 tons.

For mill prices of structural steel, see Pittsburg report. Freight to Chicago is 18 cents. We quote from local jobbers' stocks as follows:

All angles, 3 inches and larger, including 6 inches, $1.70 per 100 pounds; angles over 6 inches, $1.80 per 100 pounds base; beams, 3 to 15 inches, inclusive, $1.70 per 100 pounds base; channels, 3 inches and larger, $1.70 per 100 pounds base.

Rails and Track Supplies.—Aside from 1,000 tons of 70-pound rails awarded last week to the Cambria Steel Co., nothing of any moment has occurred this week. Light rails are very active and there is a brisk demand for spikes, bolts and angle bars. Contracts for a total of 13,000 tons of tie plates were taken by the Illinois Steel Co. last week, 10,000 tons of which are for the Santa Fe, which is the second order of this size received for this material from this railroad. The remaining 3,000 tons was from another southwestern road. The Northern Pacific is also figuring on 600,000 tie plates, approximately 1,000 tons, for deliveries this year.

See Pittsburg report for prices on standard sections. On light rails, Chicago delivery, we quote as follows:

Light rails, 40 and 45-pound, $26; 30 and 35-pound, $26.75; 16, 20 and 25-pound, $27; 12-pound, $28. In lots of 250 to 500 tons a reduction of 60 cents a ton from these prices is made; lots of 500 tons and up carry a reduction of $1 a ton. Track supplies, f. o. b. Joliet, angle bars, 1.50c to 1.60c; spikes, 1.75c; track bolts, with square nuts, 2.15c to 2.20c; with hexagon nuts, 2.30c to 2.40c; small railroad and square boat spikes, 1.90c base, f. o. b. Chicago.

Merchant Pipe and Boiler Tubes.—Other than that there is a good demand from jobbing channels for both pipe and tubes, there is nothing to state regarding these materials. Prices are without change. We quote for lap-welded tubes out of store, 65 off, and for charcoal, 50 off. For mill discounts, see Pittsburg report.

Cast Iron Pipe.—There were no inquiries of any importance last week. The contract for the 2,500 tons of pipe wanted by the city of Cincinnati has not been awarded, but it is stated that the Dimmick Pipe Co. is the low bidder. The United States Cast Iron Pipe & Foundry Co. secured the contract for the 600 tons of pipe for the suburb of Mt. Healthy, O., and the contracting firm of Katz & Craig, Omaha, secured the contract for 700 tons of pipe for Auburn, Kans. We quote prices as follows: Four-inch water pipe, $27.50; 6 to 14-inch, $26.50; larger sizes, $25.50; gas pipe, $1 a ton higher.

Wire Products.—One of the attractive features of present conditions in the wire trade is that retailers generally are carrying larger stocks. Jobbers are energetically endeavoring to replenish their warehouses, but because of the very heavy demand for material and the fact that mills have abso-

lutely depleted their stocks, this is not being accomplished very rapidly. Mills are behind on their deliveries of both nails and barb wire, with little prospect of overtaking same unless July and August prove quiet months as is customary. As indicative of the future, it is noted that premiums of $2 to $3 a ton are asked on late deliveries of fencing and manufacturing material. There continues to be more or less talk of an advance in the entire wire schedule, but it is authoritatively stated that none is contemplated in the near future. We quote, to jobbers, Chicago delivery, as follows:

Wire nails, jobbers' carload lots, $1.88; retailers' carload lots, $1.93; retailers, less than carload lots, $2.03; painted barb wire, jobbers' carload lots, $1.88; retailers' carload lots, $1.93, with 30c for galvanizing; plain wire to jobbers in carloads, $1.68; staples, $1.88. Wire rods, Bessemer, $27; open-hearth, $28; chain rods, $27, f. o. b. Pittsburg.

Old Material.—Prices have softened within the week from 25 cents to 50 cents a ton. Further recessions are expected before the week is out, the prospect of a strike in the mills of the Republic Iron & Steel Co. being a strong bear factor. That jobbers are carrying enormous stocks is evidenced by their failure to support the market on new railroad offerings, as well as by the large number of offers that are made whenever any mill is known to be buying material. On a purchase by one mill of 500 tons of railroad wrought a few days ago, the market worked down 25 cents, while the active competition to sell on other inquiries indicated a nervous feeling on the part of the heavily stocked dealers. The tonnage of scrap in Chicago yards is variously estimated at from 200,000 to 500,000. The only new list out this week is that of the Rock Island, which contains 2,500 tons. A sale of 2,500 tons of car wheels was reported to have been made last week by the C., R. I. & P. Ry. to the Griffin Wheel Co., the price stated being $16. This railroad was reported a short while ago to have over 50,000 old car wheels in stock in Chicago. We have revised our prices and quote gross tons in the first paragraph as follows:

Old car wheels	15.50 to 15.75
Old iron rails	17.00 to 17.25
Rerolling rails (4 ft. and over)	15.75 to 16.00
Old steel rails (2 ft. and under)	15.25 to 15.50
Light section relayers, 45 lbs. and under subject to inspection	21.00 to 23.00
Relaying rails, subject to inspection	19.00 to 19.50
Frogs, switches and guards	14.25 to 14.50
Heavy melting steel	14.00 to 14.25

We quote, net tons, as follows:

No. 1 R. R. wrought	$13.25 to 13.50
No. 2 R. R. wrought	12.25 to 12.50
Knucklers, couplers and springs	13.25 to 13.50
Shafting	15.25 to 15.50
Iron car axles	18.00 to 18.25
Steel car axles	17.25 to 17.50
Dealers' forge No. 1	10.75 to 11.00
Pipes and flues	9.75 to 10.00
No. 1 cast, 150 lbs. and less	13.50 to 13.75
No. 1 mill	7.25 to 7.50
No. 1 busheling	10.75 to 11.00
Mixed busheling	8.00 to 8.25
No. 1 boiler cut	10.00 to 10.25
Boiler punchings	13.25 to 13.50
Cast borings	6.00 to 6.25
Mixed borings, etc.	6.00 to 6.25
Machine shop turnings	8.00 to 8.25
Railroad malleable	12.75 to 13.00
Agricultural malleable	11.25 to 11.75
Stove plate and light cast scrap	11.50 to 11.75
Old iron splice bars	15.75 to 16.00

CLEVELAND.

Interest in Expansion of M. A. Hanna & Co.—No Extension of Contracts.

Office of THE IRON TRADE REVIEW, Browning Building, June 29.

Iron Ore.—The strike on the great lakes has practically collapsed, and very little difficulty is encountered in moving ore and other freight. Sales of ore continue at a satisfactory rate with nearly all of the ore interests. On base ores with the guarantee of 55 per cent on old range and Mesabi Bessemer, and 51½ per cent on old range and Mesabi non-Bessemer, we quote as follows: Old range Bessemer, $4.50; Mesabi Bessemer, $4.25; old range non-Bessemer, $3.70; Mesabi non-Bessemer, $3.50.

Pig Iron.—The market continues quiet, but prices are firm. Stocks of foundry pig iron in Cleveland and the valleys are low, and a good buying movement in steel making irons is expected soon. Considerable interest is manifested in the prospect that M. A. Hanna & Co. will soon be the sales agents of the products of the Cherry Valley and Fannie furnaces. Some interests are holding firmly at $15.50 valley. The lowest quotation in Cleveland is $15 at the furnace for outside delivery, while from $15 to $15.65 is obtained delivered in the city. We quote delivered in Cleveland as follows:

No. 1 foundry	$16.00 to 16.25
No. 2 foundry	15.50 to 15.75
No. 3 foundry	15.00 to 15.25
No. 2 southern	15.85
Gray forge	14.90 to 15.00
Bessemer	16.00 to 16.15
Lake Superior charcoal	19.00 to 19.50
Jackson Co. 8 per cent silvery	20.05

Coke.—There is increasing difficulty in obtaining labor in the coke regions, and there is a scramble among the different companies to get workingmen. One case is reported in which one company succeeded in getting 40 men away from a rival concern. There is very little activity in the market, and concessions are being made for spot delivery. We quote spot furnace coke at $1.50 to $1.65 at the ovens, and on contract, $1.70 to $1.75. For first class Connellsville foundry coke we quote $1.80 to $2 for spot, and on contract, $2 to $2.25.

Finished Materials.—Cleveland agencies are unanimous in declaring that contracts expiring July 1, which have not been fully specified, will not be extended, except under very extraordinary conditions. The two vessels ordered by the Pittsburg Steamship Co. will require 9,500 tons of plates and shapes, to be furnished by the Carnegie Steel Co. A large part of this steel has already been specified. There is a good run of orders in nearly all lines, and specifications are steady. The Empire and Union rolling mills will be idle throughout July, although the bar iron market shows some improvement, and prices are somewhat higher. It is expected that the new 152-inch plate mill of the Otis Steel Co. will be placed in operation next week.

It is expected that the leading interest will soon announce an advance in the prices of plates and shapes. It is still selling bars at 1.20c Pittsburg, and plates aand shapes at 1.30c. A jobber who was offered 1.25c on bars with specifications for the first half of next year by an independent concern declined to accept the offer. The prevailing opinion is, however, that bars will be considerably higher than 1.25c by the first of the new year. The demand for spikes has improved and prices are not so irregular.

Old Material.—With smaller and smaller quantities of material passing to consumers, and practically no new contracts being made, the local market has begun to soften. Heavy steel has been reduced 25 cents a ton, country mixed steel 50 cents a ton, and old steel boiler plate 25 cents a ton under last week's quotations. On the other hand, railroads have been getting fair prices for their offerings, one railroad in particular with general offices in this city last week securing prices that in the face of the present general scrap market conditions are considered little short of astonishing. We quote f. o. b. Cleveland as follows:

Old iron rails	$16.50 to 17.00
Old steel rails (re-rolling)	15.00 to 15.50
Old steel rails (under 6 feet)	15.00 to 15.50
Old car wheels	15.50 to 16.00
Old steel boiler plate	12.25 to 12.75
Mallable iron (railroad)	14.00 to 14.50
Steel axles	18.00 to 18.50
Malleable iron (agricultural)	13.00 to 13.50
Heavy steel	14.00 to 14.50
Country mixed steel	12.50 to 13.00
Low phosphorus	16.00 to 16.50

We quote, net tons, as follows:

No. 1 R. R. wrought	$14.00 to 14.50
No. 1 busheling	12.00 to 12.50
No. 1 machine cast	12.50 to 13.00
Iron axles	17.50 to 18.00

Axle turnings	10.00 to 10.50
Machine shop turnings	8.50 to 9.00
Grate bars	11.00 to 11.50
Pipes and flues	11.50 to 12.00
Tank iron	10.00 to 10.50
Hoop and band iron	9.00 to 9.50
Sheet iron	8.00 to 8.50
Wrought drilling	8.50 to 9.00
Stove plate	11.00 to 11.50
Cast borings	7.50 to 8.00

CINCINNATI.

Southern Pig Iron Advances in Spite of Limited Demand.

Office of THE IRON TRADE REVIEW,
First National Bank Building, June 29.

Pig Iron.—The southern pig iron market has advanced to a basis of $12 Birmingham during the past week. Quotations of $11.50 Birmingham and $11.75 were made until Friday and Saturday, but on Monday, so far as can be learned, $12 is the minimum, with one large producer asking $12.50 Birmingham. The advance appears to have been hastened by the investment inquiry which has come out recently and some round lots have been taken by investors on the basis of $11.50 Birmingham. The southern furnaces have received firm offers from dealers, commission houses and brokers for such a considerable tonnage that it has caused them to put up prices. It is probable that a few old quotations may be protected on the $11.50 basis, but on such inquiries as came out after Monday, June 28, $12 Birmingham was the best that could be done in this market. Northern iron remains unchanged, but apparently firm at $14.50 Ironton for No. 2 foundry or malleable at furnace. One sale of 1,000 tons of southern iron No. 2 and 3 foundry for delivery over the last four months of the year on the basis of $12 Birmingham was reported. A large consumer of malleable in this territory bought 2,000 tons for last half delivery at $14.50, and another lot of 500 tons sold in St. Louis territory at $14.50, southern Ohio furnace. The general inquiry and demand are light and the market as reported by the various sales agencies is quiet. Shipments are slightly better and there are indications of the melt increasing. The situation is, nevertheless, peculiar, as the market has advanced 50 cents per ton on southern iron at a time when there is practically no increased demand from consumers, and it is the opinion of the trade here that the upward turn in the market at this time has been brought about by speculative influence not wholly justified by the actual situation as to supply and demand. Nevertheless, it is a highly satisfactory condition to the southern producers to begin the second half of the year with a $12 market, as a large part of the iron that will be shipped on contracts has been taken at $11 and some at $11.50, which will be decidedly favorable to the furnaces, as consumers will be more willing to take iron on their contracts on a $12 market than would be the case at a lower level. We quote for shipment over the remainder of the year, delivered Cincinnati, based on freight rates of $3.25 from Birmingham and $1.20 from Ironton, as follows:

Southern foundry No. 1	$15.75
Southern foundry No. 2	15.25
Southern foundry No. 3	14.75
Southern foundry No. 4	14.25
Southern No. 1 soft	15.75
Southern No. 2 soft	15.25
Southern gray forge	13.75 to 14.00
Northern No. 1 foundry	15.95 to 16.20
Northern No. 2 foundry	15.70
Northern No. 3 foundry	14.95 to 15.20
Jackson county 6 per cent silicon	18.70
Jackson county 8 per cent silicon	19.70
Jackson county 10 per cent silicon	20.70

Finished Material.—The market is a little more quiet this week and specifications on contracts, while fair, have not been equal to the preceding two or three weeks. Mill orders are moderate, but the price situation is steady to firm.

Coke.—There are still a few foundry contracts being closed covering deliveries for second half of the year and for one year from July 1. The more deferred the delivery or the longer the time the contract has to run, the higher the price. The usual quotation for foundry coke ranges from $2 to $2.25 at the ovens. There is less inclination to offer spot coke at bargain prices. One of the Virginia operations is becoming more independent and is likely to advance its quotations in the near future. The following quotations represent prices in the leading coke producing districts, the lower figures reflecting the market on spot coke and the outside quotations indicating full prices on long time contracts:

	Per Ton.
Wise county furnace coke	$1.60 to 1.85
Wise county foundry coke	2.00 to 2.25
Pocahontas furnace coke	1.65 to 1.85
Pocahontas foundry coke	1.75 to 2.25
Standard Connellsville furnace coke	1.60 to 2.00
Standard Connellsville foundry coke	2.00 to 2.25

Old Material.—The market is dull and prices are lower than a week ago. Very light trading is reported. Rolling mills are not taking much material at this time. The average reduction in prices is about 50 cents to $1 per ton. We quote dealers' prices here as follows:

Old No. 1 R. R. wrought net tons	$13.50 to 14.00
No. 1 machinery, net tons	13.00 to 13.50
Old iron rails, gross tons	15.00 to 16.00
Old steel rails (re-rolling) gross tons	14.00 to 14.50
Old short lengths, gross tons	13.50 to 14.00
Old iron axles, net tons	17.00 to 17.50
Heavy melting scrap, gross tons	13.00 to 13.50
Stove plate, net tons	10.50 to 11.00
Heavy turnings, net	9.50 to 10.00
Cast borings, net tons	7.50 to 8.00
Car wheels	14.00 to 14.50

NEW YORK.

Good Inquiry for Basic Pig—Favorable Showing for June in Structurals.

Office of THE IRON TRADE REVIEW,
Room 1005, No. 90 West St., June 29.

Pig Iron.—Prices rule higher with $16.75 the figure quite generally asked for No. 2X. There has been a natural slackening in orders preceding the Fourth and no business of any particular note has been placed in this immediate territory. The pipe people are still buying where they can, but find a strengthening market. The leading interest has purchased a round tonnage during the week from Buffalo furnaces. Inquiries for basic are in the market totaling over 15,000 tons. There are also a couple of inquiries for low phosphorus, one of 1,000 tons and one of 500 tons. Southern iron is ranging at least 25 cents higher and a leading interest has refused to book 3,000 tons for third quarter at $11.75 as well as 3,000 tons for fourth quarter at $12, holding to $12 for third quarter and $12.50 for last quarter. Some good tonnages, 1,000 and 2,000 tons, have been taken in foundry grades in New England. We quote:

Northern foundry No. 1	$17.00 to 17.50
No. 2X foundry	16.50 to 17.00
No. 2 plain	16.00 to 16.50
No. 2 southern foundry	16.25 to 16.75
Malleable	17.25 to 17.75
Gray forge	15.25 to 15.75

Ferro-Alloys.—We learn of a sale of 500 tons of ferro-manganese for fourth quarter delivery at $41.75, seaboard, and 500 tons for first half at $43. Ferro-silicon, 50 per cent, is quoted at $63, seaboard, for last quarter with but few sales.

Finished Materials.—At the close of its month, next Saturday, the American Bridge Co. will have booked about 45,000 tons for June, which is approximately one-third of the total tonnage placed. July, it is thought, will make a still better showing and will more nearly approach the tonnage taken in May. The American Bridge Co. booked about 9,000 tons during the past week and other interests about 15,000. Sixty-two inquiries were received in the eastern division alone during the week, mostly Friday and Saturday, totaling 25,000 tons. The western portion of the country is still active, with little doing throughout the central states. The volume of small orders shows a steady increase. The leading interest has outstanding tenders on about 135,000 tons, including 50,000 in the western district, 25,000 tons in the Pittsburg territory and 60,000 tons in the eastern division. Orders taken included: 4,000 tons for

the subsidiary companies of the United States Steel Corporation by the American Bridge Co., which will also furnish 5,000 tons for two cooling mills for the Gary plant; 1,000 tons, Brandies theater, Omaha, American Bridge Co.; 4,000 tons, American Bank Note Co. building, Bronx, Post & McCord, the steel for which will go to the American Bridge Co.; 250 tons, Philadelphia & Reading, American Bridge Co.; 700 tons, Chicago & Northwestern, divided between Worden-Allen and the Minneapolis Construction Co.; 2,700 tons, bridge, Willamette river, Portland, Ore., United Engineering Co., the Pennsylvania Steel Co. to furnish the steel; 500 tons, Metropolitan Bank, New Orleans, Virginia Bridge Co.; 300 tons, Peerless Motor Co., McClintic-Marshall; 500 tons, power house, Chicago & Northwestern, to the Fuller Co., bids on steel now being taken; structural material for 500 cars to be built by the American Car & Foundry Co. for the Central Railroad of New Jersey, to the Eastern Steel Co. The Pennsylvania Steel Co. is reported to have taken the contract for furnishing the 9,000 tons of steel for the sub-structure of the New York postoffice, for which C. H. Peckworth has the general contract. Bids have gone in on 3,000 tons for a viaduct on Long Island for the Pennsylvania Tunnel & Terminal Railroad Co.; 1,600 tons, office building, Forty-second and Broadway; 800 tons, loft building, West Fortieth street, New York; 400 tons, Pacific Union club, San Francisco; 1,000 tons, Y. M. C. A. and Y. W. C. A. building, Nashville; 700 tons, court house, Portland, Ore. New inquiries include 1,100 tons for the Iowa lines of the St. Paul railroad. Revised plans have been issued for the high school building at Bedford, Mass., 1,500 tons; while the proposed Hearst building, San Francisco, 2,000 tons, is again in the market. We quote: Angles, 3 to 6 inches x ¼-inch and heavier, 1.46c; beams, 3 to 15 inches, 1.46c; tees, 3 x ¼-inch and heavier, 1.51c; plates, carloads, tank, 1.46c; marine boiler, 1.86c; bar iron, 1.35c to 1.40c; soft steel bars, 1.36c; sheets, No. 28 black, 2.56c.

Cast Iron Pipe.—R. D. Wood & Co. has secured the sub-contract for 14,000 tons of cast iron pipe for the New York City high-pressure system. Little new business has developed during the week.

Old Materials.—There is practically no change in the market situation and prices remain about the same. We quote:

Old steel rails (rerolling)	$13.50 to 14.50
Relaying rails	19.00 to 19.50
Old car wheels	13.00 to 13.50
Old iron car axles	20.00 to 20.50
Old steel car axles	18.00 to 18.50
Heavy melting steel	13.00 to 13.50
No. 1 railroad wrought	15.50 to 16.00
Iron track scrap	13.50 to 14.00
Wrought pipe	12.00 to 12.50
Cast borings	7.50 to 8.00
Wrought turnings	9.00 to 9.50
Heavy cast scrap	12.50 to 13.00
Railroad malleable	11.50 to 12.00
Stove plate	10.00 to 10.50
Grate bars	10.00 to 10.50

PHILADELPHIA.

Pig Iron Prices Firmer, but Prompt Southern Still Sells at $11.50.

June 29.

Pig Iron.—Advances of 25 to 50 cents a ton are now the rule for fourth quarter shipment in foundry grades, with the market showing few weak spots. While there has been no general advance in prices, the market is much stiffer and only the idle furnace capacity prevents a general advance. It is still possible to buy No. 2X at $16.75 for fourth quarter delivery but the quantities taken at that figure are limited. The selling interest which had an offer of 600 tons on such a basis would book only half the amount. Several of the furnace companies are asking $17, being well sold up and not caring for further tonnages at lower figures. A Virginia furnace interest, which is said to have something like 100,000 tons of stock on its yards, mostly foundry grades, is holding for higher figures. Southern irons are ruling 50c higher in some instances, that addition being asked by the leading interests. Immediate sales are still at $11.50, however. We note a sale of 1,000 tons of malleable. There has been some gray forge taken, that grade being especially scarce and showing a tendency to advance in price. Two inquiries for basic, one of 8,000 and one of 7,500 tons, are in the market, with $16.00 the ruling price asked. The Pennsylvania Railroad has an inquiry out for a round tonnage of foundry irons. A couple of sales of small lots of low phosphorus have been made on the basis of $20 delivered here. We quote:

No. 1X foundry	$17.00 to 17.50
No. 2X foundry	16.50 to 17.00
No. 2 plain	16.00 to 16.50
Standard gray forge	15.25 to 15.75
Basic	15.50
Low phosphorus	19.00 to 20.00
No. 2 Birmingham	15.75 to 16.25
No. 2X Virginia	16.75 to 17.25
No. 2 plain Virginia	16.25 to 16.75

Finished Materials.—The market shows no material change. The Harlan & Hollingsworth Corporation will build two steel hull passenger vessels for the Wilson Lines' service between Philadelphia & Wilmington. An inquiry is in the market for 800 tons of structural for the Hotel Casey, Scranton, Pa. We quote: Structural material, 1.45c to 1.55c; steel plates, 1.45c to 1.55c; sheets No. 28, 2.80c; steel bars, 1.40c to 1.45c; refined bar iron, 1.45c to 1.50c.

Old Materials.—The market is active, the demand being more from the steel than the rolling mills, however. Prices show little change. We quote:

Old steel rails (re-rolling)	$16.75 to 17.25
No. 1 steel scrap	15.75 to 16.25
Old steel axles	20.50 to 21.00
Old iron axles	23.00 to 23.50
Old iron rails	20.00 to 20.50
Old car wheels	15.50 to 16.00
Choice scrap R. R. No. 1 wrought	17.50 to 18.00
No. 1 yard scrap	16.50 to 17.00
Machinery scrap	15.00 to 15.50
Low phosphorus scrap	19.50 to 20.00
Wrought iron pipe	15.50 to 16.00
No. 1 forge fire scrap	13.00 to 13.50
No. 2 forge fire scrap, ordinary	9.50 to 10.00
Wrought turnings	12.75 to 13.25
Axle turnings, heavy	13.00 to 13.50
Cast borings	11.00 to 11.50
Stove plates	13.00 to 13.50

ST. LOUIS.

More Favorable Outlook in Pig Iron —Inquiry for Malleable.

June 28.

Pig Iron.—The market for pig iron looks a good deal brighter in the St. Louis territory. Customers say one or two furnaces are offering No. 2 at $11.50, Birmingham, for prompt shipment, but it is generally contended that the market price is nearer $12, with little business being placed. There are some good inquiries out for the third and last quarter delivery, and it is believed the last quarter price will not be less than $12.50. The 3,000-ton inquiry submitted by a St. Louis firm last week was turned down at $11.50 offered for delivery over the third quarter.

One inquiry is pending for from 1,200 to 1,800 tons of malleable Bessemer pig iron for delivery over the last half of the year. This was put out by one of the largest malleable iron foundries in the St. Louis territory, and the buyers are willing to take the entire tonnage immediately if the price is made an inducement.

Our prices, delivered, to which the freight of $3.75 from Birmingham has been added, follow:

No. 1 southern	$15.75 to 16.25
No. 2 southern	15.25 to 15.75
No. 3 southern	14.75 to 15.25
No. 4 southern	14.25 to 14.75

Coke.—Connellsville 72-hour foundry coke is strong at $2.15 to $2.25, ovens, for delivery over the remainder of the year some ovens are asking $2.40. The best 48-hour Connellsville furnace grades for delivery over the last half are bringing $1.75 to $2, ovens.

Old Material.—The scrap iron market is picking up materially; there is a strong buying tendency, and dealers in the St. Louis territory are very hopeful. Advances in quite a number of kinds of scrap are reported this week. Our prices are as follows:

Cast iron borings, free from foreign material, net tons	$ 5.00 to 5.50
Steel axle turnings, gross tons	11.00 to 12.00
Steel railroad axles, net tons	17.00 to 18.00
Iron railroad axles, net tons	18.50 to 19.50
Miscellaneous steel scrap, gross tons	10.00 to 11.00
Old car wheels, gross tons	15.00 to 15.50
No. 1 railroad cast scrap, net tons	11.00 to 11.50
Heavy machinery cast, net tons	13.00 to 13.50
Stove plate and light cast, net tons	10.00 to 10.50
Sheet iron, net tons, uncut	4.00 to 5.00
No. 1 railroad wrought, net tons	12.00 to 13.00
Railroad malleable, net tons	12.00 to 12.50
Heavy melting steel, net tons	11.00 to 12.00
Relaying rails, net tons	17.00 to 18.00

BUFFALO.

Pig Iron Market is Quiet, but Outlook is Favorable.

Office of THE IRON TRADE REVIEW, 932 Ellicott Square, June 29.

Pig Iron.—A quiet market prevails this week, but none of the steadiness has been lost and all indications point toward stronger conditions, which, it is asserted, are likely to influence prices on pig at any time. The demand which toned up the market for several weeks, bringing it nearer to normal than it had been in two years, has relaxed somewhat without weakening business, and the quiet prevailing is more like an expectancy of heavier business which is to come. The heavy railroad orders in other localities of recent date have given firmness to local conditions, as a favorable reaction may be expected from the heavy orders for railroad stock. We quote, f. o. b. Buffalo, for third quarter delivery as follows:

No. 1X foundry	$15.25 to 15.75
No. 2X foundry	14.75 to 15.25
No. 2 plain	14.50 to 15.00
No. 3X foundry	14.25 to 14.75
Malleable Bessemer	15.00 to 15.50
Gray forge	14.25 to 14.75
Charcoal	19.50 to 20.50

Finished Products.—No strength has been lost in this market, and if any change has occurred in the last week it is that of a betterment for the producer. There seems to be some indifference in the matter of taking orders. Certain interests have declined considerable business of late and report the mills being taxed to their utmost with orders six weeks ahead. Little letting is reported, but specifications on substantial structural business are being figured. It is understood quotations are being made on bars at 1.25c f. o. b. Pittsburg, and 1.35c on small shapes and plates, these advances still prevailing.

BRITISH IRON MARKET.

Perceptible Halt in Pig Iron Has Brought Lower Prices.

Office of THE IRON TRADE REVIEW, Prince's Chambers, Corporation St., Birmingham, England, June 19.

The week has not been a good one for pig iron, prices having receded 6d per ton. Business was done yesterday for No. 3 Cleveland at 48s 3½d ($11.83) cash, which was a fall of nearly 9d on the week. For forward buying there is still a marked increase in price, the figure for three months being 48s 11d ($11.98). Stocks continue to increase, the addition this month being 7,700 tons, but the amount in store yesterday was 230,356 tons. Shipments this month have been 58,294 tons compared with 52,230 last month, and 61,780 in the corresponding month of last year. All the pig iron markets report a slight set-back in business. This is particularly the case in Lincolnshire where prices were recently raised. In the Birmingham market on Thursday Northamptonshire pig iron was obtainable at 6d to 9d below recent quotations. It is quite likely this will be a temporary set-back but it has had a bad effect. The hematite iron trade is rather weaker, mainly on account of the comparatively poor outlook for steel. Mixed numbers can be had for 55s ($13.46), although the majority of the makers ask for another sixpence. Nobody doubts that the weakness will be temporary, but it has had a rather bad effect, and it is assisted to some extent by the stock-taking which goes on at the end of June.

Finished Trade.—Of the British iron trade generally, it may be said that the forward movement still lags. For once, the bright reports from America are not having much effect.

METAL MARKETS.

ST. LOUIS.

June 29.

Lead and Zinc.—The base price for 60 per cent zinc ores in the Missouri-Kansas-Oklahoma district rose to $46 last week, the record quotation for the year. High-grade ores from the various camps were steady at $45 a ton base, and low-grade ores from the Miami camp, which have not passed $45 heretofore, jumped up $1. The predominating price in Webb City was $45, and the bulk of the ores sold in the outlying districts for $44.50. The highest price reported to have been paid for 63 per cent ore was $47.50. This was paid in the Joplin camp on an assay base of $44.50. The loading of ore was hampered by wet weather, and a vast amount of mineral sold last week does not figure in the production statistics. The St. Louis spelter market remained firm at $5.37½. Lead ore slumped $1 a ton. The best price paid was $59 a ton as compared with $60 the preceding week. Pig lead was weaker in St. Louis, the market closing at $4.35. Calamine did not change much from the preceding week, the bulk of the mineral selling for from $20 to $24 a ton.

NEW YORK.

June 29.

Copper.—The market has been very much mixed. The United Metals Selling Co. has continued to ask 13⅞c for Lake and 13¾c for electrolytic, delivered, 30 days, but is doing no business at those figures, and is maintaining former asking prices simply because it has no present wish to meet the market. Calumet & Hecla is also understood to be temporarily out of the market. On the other hand the majority of the large selling agencies have been taking, at the declining prices, such business as has been offered, and certain first hands have manifested some pressure to sell. We quote Lake, 13¼c to 13⅝c; electrolytic, 13 to 13⅛c; casting, 12¾c to 13c.

Tin.—In sympathy with copper, tin has shown a declining tendency in London. Shipments from the Straits are reported as being larger than anticipated, while consumption in the United States leaves much to be desired. We quote 29c to 29¼c.

Lead.—Business has been quiet and prices are unchanged at 4.35c, New York, for ordinary brands.

Spelter.—The market has shown persistent strength, and while the extreme activity has subsided now that the worst is known, there is an inflow of orders. We quote 5.40c to 5.45c.

Antimony.—The market continues dull with only small sales. Prices are nominally unchanged at 8⅜c for Cookson's, 7⅞c for U. S.; 7⅜ and 7⅝c for outside brands. Some sales are made subject to tariff should a tax be imposed.

CHICAGO.

June 29.

Buying of metals in the week under review has been of an inactive nature. The market is holding its own, however, and prices are firm. We quote as follows: Lake copper, carload lots, 14c to 14¼c; casting 13½c to 13¾c;

smaller lots, ¼c to ⅜c higher; spelter, 5.45c to 5.50c; lead, desilverized, 4.50c to 4.60c in 50-ton lots; corroding, 4.75c to 4.85c in 50-ton lots; carlots, 2½c per 100 pounds higher; sheet zinc, $7 list f. o. b. LaSalle in carlots of 600-pound casks; Cookson's antimony, 10½c, and other grades, 9¾c to 10¼c.

Old metals are also without change in price, but the market is listless. We quote as follows:

Copper wire, 11¾c to 12c; heavy copper, 11½c to 11¾c; light copper, 10¾c to 11c; heavy red brass, 10¾c to 11c; heavy yellow brass, 8½c; light brass, 6¼c; No. 1 red brass borings, 9c to 9¼c; No. 1 yellow brass borings, 7¾c; brass clippings, 8¼c; tea lead, 3.60c; lead scrap, 3.90c; zinc, 3.60c; tin pipe, 24½c; tin foil, 23c; pewter, 17½c; electrotype plates, free from wood, 4c; electrotype dross, 2.90c; stereotype plates, 4⅛c; stereotype dross, 3c; prime slab zinc dross, $60 per ton.

SOUTHERN PIG ADVANCES.

(Special Telegram.)

Cincinnati, O., June 30.—The Republic Iron & Steel Co. advanced pig iron to $12.50 on Monday and Sloss-Sheffield wired, advancing to $12.50, effective today. The Republic is practically sold up for third quarter. The Tennessee company is reported out of the market. Woodward is offering very little Rockwood and Vanderbilt is not offering. It looks as though the price is going to $12.50 basis. Some last quarter sales are reported at $12.

VIADUCT CONTRACT

The McClintic-Marshall Construction Co., of Pittsburg, has been adjudged by the supreme court of the state of Ohio the successful bidder for the construction of the Denison-Harvard viaduct at Cleveland. The contract had been previously awarded by the board of county commissioners to the King Bridge Co., also of Cleveland. The opinion of the court has not been handed down in full, but may be next Monday. The decision of the supreme court reverses the holding of the circuit court of Cuyahoga county, and embraces two cases.

The Cincinnati Iron & Steel Co., Cincinnati, has just completed installing a 30-ton electric Case crane with the Cincinnati Traction Co., and has also secured an order for a 40-ton Case electric crane for the Nashville Railway & Light Co., Nashville, Tenn.; also an order for a 180,000-pound shear to cut 6-inch square material for the Goldberger Iron Co., Pittsburg.

LABOR QUESTION.

(Continued from first page.)

the Brown-Bonnell mills at Youngstown, O., and Sylvan, at Moline, Ill., on an open shop basis. These plants were shut down this week upon the expiration of the annual scale, in order to permit inventory taking which always takes place at this season and their resumption will depend upon the settlement of the question involving their labor status.

An amicable adjustment of the bar iron scale was reached June 26 at a meeting of the representatives of the Western Bar Iron Association and the Amalgamated association officials at Cambridge Springs. Practically no change was made in the scales that had prevailed during the past year, the boiling rate remaining $5 a ton upon a one cent a pound bar iron card. Some alterations were made in the memoranda of agreement and the various foot notes to the different scales. The manufacturers at the original conference at Detroit had asked for a reduction from the past year's scales.

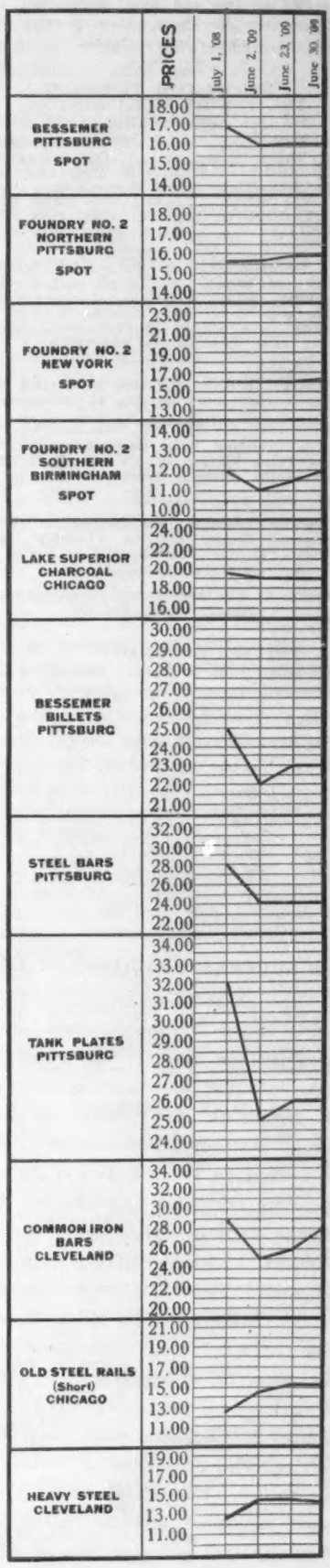
The independent sheet and tin plate manufacturers, in conference with the Amalgamated Association, at Pittsburg, June 29, signed the wage scale and working agreement extending from July 1, 1909, to July 1, 1910. In all particulars the scale is the same as that enforced last year.

UNITED PROPERTIES

Will be Handled by M. A. Hanna & Co.—Two Furnace Plants.

A deal has been closed whereby M. A. Hanna & Co., Cleveland, will handle the properties of the United Iron & Steel Co., general offices of which are at Pittsburg. These properties include Cherry Valley furnace at Leetonia, O., and Fannie furnace at West Middlesex, Pa., with a rated combined capacity of 210,000 tons annually, and the United company also owns a controlling interest in the Pittsburg Iron Ore Co., owning and operating the Brunt mine on the Mesabi, and operating the Hobart, Nassau, La Rue and Croxton mines on the same range, the annual output of which usually runs from 800,000 to 1,000,000 tons. The Pittsburg company also has over 700 acres of undeveloped coking coal lands in Fayette county, Pa., together with 200 bee-hive coke ovens at Leetonia. The magnitude of the deal can be understood from the fact that the United Iron & Steel Co., which was organized in 1906, was capitalized at $2,000,000.

PRICE CHART.



THE IRON TRADE REVIEW

Devoted to Iron and Steel Manufacture and to the Machinery, Metal-Working and Foundry Trades.

PUBLISHED EVERY THURSDAY BY
THE PENTON PUBLISHING CO.
CLEVELAND.

BOSTON.....73-74 Journal Bldg.
BUFFALO.....932 Ellicott Sq.
CHICAGO.....1328 Monadnock Blk.
CINCINNATI.....First National Bank Bldg.
NEW YORK.....1005 West Street Bldg.
PITTSBURG.....510 Park Bldg.
SEATTLE.....302 Pioneer Bldg.

Subscription, United States and Mexico, $3.00 per annum. To Canada and Foreign Countries, $4.50. The price of copies issued three months or more previous to date of current issue will be 25 cents each. Advertising rates furnished on application.

Change of advertising copy must reach this office ten days preceding date of publication.

The Cleveland News Co. will supply THE IRON TRADE REVIEW through the regular channels of the American News Co.

European Agents: The International News Company, Breams Building, Chancery Lane, London, E. C., England.

ENTERED AT THE POST OFFICE AT CLEVELAND AS SECOND CLASS MATTER.

PRINTED IN AN OPEN SHOP.
COPYRIGHT 1909 BY PENTON PUBLISHING CO.

THE AVERAGE PAID CIRCULATION OF THE IRON TRADE REVIEW FOR THE ISSUES OF THE FOLLOWING MONTHS WAS:

January	5,506
February	5,346
March	5,396
April	5,508
May	5,533
June	5,551

July 1, 1909.

A SUCCESSFUL CONVENTION.

Although the Society of Naval Architects and Marine Engineers was organized in 1892, it has until this year held but one meeting annually, in November, and always in New York. Its first summer meeting, held in Detroit on June 24, 25 and 26, was therefore somewhat experimental. Although slightly disappointing as to numbers, it was highly successful in all other respects. The professional sessions were called to order on time and the number of papers was limited to eight, of which one, by Alex. E. Brown, of the Brown Hoisting & Conveying Machine Co., Cleveland, was canceled because of the illness of the author. The list was one of unusual excellence and the fullest opportunity for discussion was afforded, though on account of the light attendance this was not so extended as usual.

The entertainment features were complete and were thoroughly appreciated, especially by the eastern members, and the summer convention will undoubtedly become a permanent affair.

PAPERS WORTH READING.

This week's issue of THE IRON TRADE REVIEW is unusually rich in papers on engineering topics, which we trust will be carefuly perused by our readers. If the weather seems too hot for reading of this kind at present, put this issue aside until the temperature takes a drop, for you cannot afford not to read such papers as those which we publish today.

Dr. Chas. B. Dudley has long stood in the front rank of those who have rendered great and unselfish service to the engineering profession, and his presidential address delivered before the American Society for Testing Materials is fully up to the high standard of his splendid reputation. Every paragraph is meaty and shows the results of a long life and invaluable experience.

The paper by Chas. B. Going, managing editor of the *Engineering Magazine*, read at the meeting of the Society for the Promotion of Engineering Education, in New York, last week, is a scholarly effort and abounds in practical suggestions which deserve most careful consideration by all who are in any way influential in the conduct of the engineering schools of the country. That Mr. Going's criticisms are well founded is shown by the results of the careful investigation by Hugo Diemer, professor of mechanical engineering at Pennsylvania State College, and presented in his paper read at the New York meeting. The fact that the answers which he received from manufacturers who had employed graduates having the degree of mechanical engineer state that only 60 per cent were satisfactory, while the remaining 40 per cent were failures in varying degrees, is startling. The answers show, of course, that graduates from engineering colleges are like all other human beings in having marked frailities. If we could have answers as to the success or failure of men who are not graduates, the list of failures would be even longer than in the case of the graduates. Nevertheless, the results of the employment of graduates in mechanical engineering, as indicated by Prof. Diemer's investigation, are disappointing.

While our own experience with men having the degree of mechanical engineer has usually been very satisfactory, we recently received a letter indicating that the attainment of that degree does not always mean that the three R's and spelling have been mastered. A professor in mechanical engineering in a university in the central west forwarded to us an application for a position from a young man who was about to graduate as a mechanical engineer. In this young man's letter, the name of the head of the department of mechanical engineering was mis-spelled, as were also the following words: Consideration —concideration; metallurgy—metalurgy; technical—tecnical; oratory—oritory.

While proficiency in orthography does not necessarily mean success in engineering, it does seem that it would be well for our educators to pay a little more attention to primary studies. A great trouble in our modern scheme of education is the lack of thoroughness from the time the child enters the primary grade until the young man receives his diploma.

In the abstract of the lecture of W. D. Taylor, chief engineer of the Chicago & Alton R. R., which we publish on pages 10 to 13, will be found the criticisms of a practical man who has also had experience as a teacher. His observations are worthy of the most thoughtful consideration of every student, graduate, college trustee and professor in the country. He talks very plainly and, without being pessimistic, shows how, from a standpoint of good morals and efficient work, the American college often fails.

PARTIES SPLIT

IN VOTING ON DUTY ON PIG IRON AND SCRAP.

Democrats Make Up for Republican Defection—High Duties on Ferro Alloys Tentatively Agreed To by the Senate.

(Special Telegram.)

Washington, June 30.—The iron and steel schedules contained in the tariff bill have been completed in the senate and will now stand as have been outlined in these dispatches unless changed in conference with the committee of the house. Monday the structural iron and steel schedule was changed and the rate on this material valued at more than 9/10 of a cent a pound increased from 3/10 to 4/10 of a cent a pound, an addition of 1/10 cent a pound to the rate proposed by the house. The effort made at the last minute to place cotton ties on the free list was defeated by a vote of 38 to 31. The rate heretofore published on ferro-alloys will also stand unless changed in conference.

Washington, D. C., June 28.—For the most part the predictions that have been made regarding the final disposition of the uncompleted paragraphs of the metal schedule have been verified in the action of the finance committee and the senate in putting the finishing touches upon the dutiable sections of the tariff revision bill and preparing the metal schedule for conference.

During the past few days practically everything that has been in controversy before the finance committee was passed upon by the committee and reported to the senate, which body adopted the recommendations of the committee, making a number of increases, settling the question as to the relative rates of pig iron and scrap iron, and adjusting the rates on wire nails compared with the rates on rods from which wire nails are produced.

Pig Iron and Scrap.

Following the action of the committee and the senate in increasing the rate on the higher grades of structural steel valued at $18 per ton or upward, the committee reached an agreement that the rates on pig and scrap should be the same, $2.50 a ton. Vigorous opposition to these rates was made by the western Republicans, who advocate lower duties. They contended that the rates on pig iron and scrap iron which under the terms of the revision bill as it passed the house were only 50 cents a ton, were more nearly correct, and they objected to the increase by the senate bill to $2.50 a ton. Defeated in the effort to reduce the pig iron duties, these western men sought to divide the question between pig and scrap and secure a lower rate on scrap iron, on the claim that the open-hearth process utilizes scrap iron and that it is unfair to the independent steel producers to subject them to so high rates upon scrap. The finance committee rejected the proposition for different duties upon scrap and upon pig iron, and Chairman Aldrich made the claim on behalf of the committee that it is impossible to find an accurate definition of scrap iron which would prevent the importation of pig iron purposely broken up to come in as scrap.

The vote in the senate upon the pig and scrap iron duties caused a decided split in the ranks of both political parties. The committee was sustained by a decisive majority of 45 to 26, but more Republicans voted against the report of the committee upon this item than upon any other feature of the metal schedule. At the same time, seven southern Democrats supported the committee, which more than made up for the Republican defection.

Wire Nails.

The demands made by the wire nail manufacturers of Pittsburg and other sections for an increased rate on nails proportionate to the rate on materials from which nails are manufactured was acceded to by the committee and the senate. The wire manufacturers assert that sufficient concession was made to the advocates of lower duties when a cut was made on the wire used in barbed wire fencing, and their insistence upon a readjustment of the rates upon wire nails, equalizing the duties to correspond with the duties on materials, was sustained by the senate. The changes in the wire nail rates increase the rate on over No. 16 wire gage from ¼ of a cent to ½ a cent, the Dingley rate, and all under No. 16 wire gage are increased from ½ a cent to ¾ of a cent.

Ferro Alloys.

Most of the issues in the metal schedule touching the question of the ferro alloys and the high grades of ore such as tungsten, etc., will have to be adjusted in conference. It is a matter of great surprise to many senators and representatives who are familiar with the metal trades that the finance committee and the senate have been willing to impose what seems to amount to prohibitive rates of duty upon the products of these high grade materials which are making such remarkable development in steel manufacturing. At the request of the Colorado miners, engaged in mining tungsten ore, the finance committee recommended a duty of 15 per cent upon tungsten ore, crude and concentrated, and the paragraph was voted into the bill over the protest of Senator Burton, of Cleveland, who insisted that the proposed rate on tungsten, as he believes is the case with respect to several of the ferro alloys, is unnecessarily high and will constitute a serious burden to the steel industry. As has been pointed out, the changes in rates from specific to ad valorem in the present bill threaten to enormously increase the duties, which have ranged at approximately $4 a ton on these alloys in the Dingley law, approximately to 25 per cent ad valorem, which rate upon the present quotations upon these alloys would have the effect, temporarily, at least, to make the ad valorem equivalent of these rates several thousand per cent instead of anything like a reasonable ad valorem duty. The prediction is made that when the conference committees go over these items in the metal schedule, material changes will be made.

Paragraph 182 of the bill in its present form is as follows:

182. Chrome or chromium metal, ferro-chrome or ferro-chromium, ferro-molybdenum, ferro-phosphorus, ferro-titanium, ferro-tungsten, ferro-silicon containing more than 15 per centum of silicon, ferro-vanadium, molybdenum, titanium, tantalum, tungsten, or wolfram metal, valued at $200 per ton or less, 25 per centum ad valorem; valued at more than $200 per ton, 20 per centum ad valorem; ferro-silicon, valued at not exceeding $90 per ton or containing not more than 15 per centum of silicon, $6 per ton.

Comparative Rates.

Although not precisely accurate, due to subsequent changes, the finanace committee during the past few days prepared and published comparative rates of duty imposed by the tariff revision bill in the metal schedule. The comparisons cover the Dingley law duties, the rates proposed by the house bill and the rate agreed to by the senate. According to the claim of the committee in these tabulations, only about a half dozen items are increased above the rates of the present law. These include steel ingots, etc., valued above 16 cents per pound; sheets and plates valued above 16 cents per pound; steel ingots, etc., cold rolled, drawn, or polished in any way, valued above 16

cents per pound, and steel circular saw plates valued at above 16 cents per pound. The admitted increase on these items ranges from 13 to 82 per cent.

The estimated reductions on all the other items of the bill below the Dingley law range from nominal reductions up to 100 per cent in the case of transfers from the dutiable list to the free list. On perhaps a third of the items the rates are reduced 50 per cent and on many others from 20 to 25 per cent. Most of the reductions below the Dingley law rate carried in the senate bill are the same as were carried in the bill as it passed the house of representatives. ARTHUR J. DODGE.

MEETING OF SOCIETY FOR PROMOTION OF ENGINEERING EDUCATION.

The seventeenth annual meeting of the Society for the Promotion of Engineering Education was held June 24-26 at Earl Hall, Columbia University, and the United Engineering Societies building, New York City.

An interesting program was carried out. The report of the secretary, A. L. Williston, Pratt Institute, Brooklyn, showed a total membership of over 700 in the organization.

The following officers were elected for the ensuing year: President, Prof. H. S. Monroe, Department of Mines, Columbia University; vice presidents, Prof. A. N. Talbot, University of Illinois, and A. L. Williston, Pratt Institute, Brooklyn; secretary, H. H. Norris, Cornell University; treasurer, Wm. O. Wiley, 43 East Nineteenth street, New York City.

Extensive abstracts of papers read at the meeting will be found elsewhere in this issue.

Plans for Avery Plant.—The plans and specifications for the new manufacturing plant of B. F. Avery & Sons, Fifteenth and Main streets, Louisville, Ky., now being prepared by George M. Brill, engineer, 1134 Marquette building, Chicago, will be completed and ready for bids July 7. Bids will be received on the buildings erected complete, also on the several distinctive parts as follows: Excavating, grading and concrete work; brick work, cut stone and terra cotta; timber and carpenter work; mill work; steel work and railings; cast iron work; roofing; sheet metal work; painting and glazing. There are 11 buildings to be constructed with a total floor area of nearly ten acres.

The plans and specifications will be on file at the offices of the owner and the engineer and copies may be obtained from the former.

IRON ORE RESERVES

Considered in Senate Committee Brief Filed by J. G. Butler Jr.

That the volume of the iron ore reserves of the United States is far larger than even official figures have so far lead observers to believe; that these reserves are being constantly added to by discoveries of new and hitherto unexplored productive territory; and that, by means of improved and therefore efficient and economical processes of concentration, vast quantities of ore that haye been regarded up to this time as of little value, while the richer Lake Superior ores are yet available, will one day be classed as "available," are some of the important statements contained in a supplemental report regarding iron ore which has been filed with Chairman Aldrich of the senate finance committee by Joseph G. Butler Jr., of Youngstown, O., chairman of the Bessemer Pig Iron Association. In his preparation of the report Mr. Butler has had the co-operation of John Birkinbine, of Philadelphia.

After having enumerated carefully the sources of his information and the means whereby he arrived at his conclusions, Mr. Butler presents these figures as his estimate of the volume of ores of the present commercial standard available in the immediate future:

	Tons.
Lake Superior	1,618,000,000
New York	750,000,000
New Jersey	135,000,000
Pennsylvania	45,000,000
South	1,814,940,000
Rocky Mountain district	100,000,000
Total	4,462,940,000

In an appendix is presented an abstract of a report prepared for the conservation commission by C. Willard Hayes, chief geologist, United States Geological Survey, wherein Mr. Hayes estimates that the total "available" iron ore in the United States amounts to 4,788,150,000 gross tons; the ore not classed as "available" under present day standards, at 75,116,070,000 gross tons.

In another appendix Mr. Butler gives the following figures as the estimated iron ore reserves of the United States Steel Corporation, the figures being furnished him by officials of the Corporation with authority to use:

	Ores of present standard commercially.	Silicious and other low grade ores.	Total.
Northern ores. Total	1,258,289,000	365,845,000	1,624,134,000
Southern ores. Total red and brown	459,300,000	239,000,000	698,300,000
Total	1.717,589,000	604,845,000	2,322,434,000

Taking the figures of the Steel Corporation of the "available" ores, 1,717,589,000 tons, Mr. Butler concludes that the Corporation owns 38½ per cent of the workable ores in the country, based upon present day standards of "availability." However, figuring the ore of all kinds, both "available" and "non-available," as 79,186,000,000 tons, he figures that the Steel Corporation, according to its own figures—2,322,434,000 tons—owns just 2.9 per cent or less than 3 per cent of the total iron ore of the United States, "instead," as he says, "85 per cent as claimed by certain United States senators."

Another point which Mr. Butler discusses, giving the sources of his information in another appendix, relates to the holdings of Cuban iron ore by the Pennsylvania Steel Co. and its subsidiary, the Maryland Steel Co. He quotes a letter from President E. C. Felton of the former company in which the statement is made that the Pennsylvania Steel Co. claims 600,000,000 tons of ore. The Bethlehem Steel Co. also owns large quantities of Cuban ore. Respecting these Cuban holdings, Mr. Butler concludes: "All this Cuban ore will be used on the seacoast, and all of the products are properly protected. I predict that within 10 years not less than 10,000,000 tons per annum of these Cuban ores will be imported and consumed on the Atlantic coast."

Preferred Shareholders Win.—Holders of preferred stock of the American Steel & Iron Co., of Lebanon, Pa., are entitled over and above the 5 per cent stipulated dividend to an equal division of further dividends with the common stockholders after the latter have received 5 per cent, is the decision of the supreme court of Pennsylvania. An amicable suit was brought in March, 1907, to test the question, some common stockholders holding that it was the intent of the agreement that preferred stock was simply entitled to 5 per cent and no more.

The Jones & Laughlin Steel Co. has closed with the C. & G. Cooper Co., Mt. Vernon, O., for a 32 and 56 x 48-inch tandem compound Corliss engine to be installed in its South Side works, Pittsburg. The engine will be direct connected and will develop about 2,000 horsepower.

AMERICAN CAR & FOUNDRY CO.

Decides to Make No Further Quarterly Financial Statements.

The report of the American Car & Foundry Co. for the fiscal year ended April 30, 1909, which has just been made public, offers the following figures on the income account:

	1909.	Changes. Decrease.
Earnings	$ 3,741,975	$6,882,599
Ren's, replacements, etc.	846,144	817,050
Net earnings	$ 2,895,831	$6,065,549
New construction		520,764
Ins. res.		225,998
Total		$ 746,762
Balance for divs.	$ 2,895,831	$5,318,787
Pref. div. (7 per cent)	2,100,000	
Balance	$ 795,831	$5,318,787
Com. div. (2 per cent).	600,000	450,000
Balance	$ 195,831	$4,868,787
Imp. and maint. appro.		1,650,000
Res. for common divs.		600,000
Total deductions		$2,250,000
Surplus	$ 195,831	$2,618,787
Previous surplus	22,367,247	*2,814,618
Profit and loss-surplus.	$22,563,078	*$ 195,831

Common stock dividends in 1908 were at the rate of 3½ per cent.
*Increase.

President F. H. Eaton in his report said that of the reserve for general overhauling, improvements and maintenance, there was expended during the year $843,418. Practically this entire amount was expended in substituting for the old wheel and gray iron foundry at St. Louis, Mo., a new fireproof plant of modern equipment, which has resulted in an increase of capacity of over 50 per cent in the production of wheels and gray iron castings and, in addition, placed the company on the strongest possible competitive basis with respect to these items. Further President Eaton said:

The business depression referred to in the president's letter to the stockholders of June 25, 1908, has continued throughout the year, covered by the present report, this depression being marked, so far as railroads are concerned, by a disinclination to order new equipment. Notwithstanding this the company even though working on a small margin of profit on the total volume of its business has been able to make net earnings sufficient to pay dividends at the rate of 7 per cent upon its preferred and of 2 per cent upon its common stock, to charge out in excess of $800,000 of its earnings for renewals, replacements, etc., and to lease in addition a surplus of $195,830, which has been added to the working capital.

Your management deems it advisable hereafter to omit the resume of the company's business which it has heretofore been its practice to present quarterly. This decision based upon the conclusion that a quarterly statement does not always fairly reflect the condition of your company's affairs in their entirety. In the conduct of so diversified a business as is done by your company, a quarterly statement sometimes gives an apparent and undue advantage to one quarter over another.

The experience of the last few years has demonstrated the practicability and economy of steel passenger car construction, both for sleeping cars as well as for ordinary coaches. The use of this class of cars has greatly increased during the past few years, and bids fair to increase still more in the future. The management has given particular attention to this phase of car construction, working along the lines of perfecting the systtem of shop practice, economy of construction, and efficiency of production.

In the purchase of real estate for additional plants during the year there has been used of the reserve heretofore made for construction of and addition to, steel car plants, the sum of $361,845.

The number of car orders on hand at the close of the year, April 30, 1909, was substantially the same as on the corresponding date of the prior year, with the difference, however, that there is every prospect of an increase of business during the coming year.

BOOK DEPARTMENTS CONSOLIDATED.

The book departments of the McGraw Publishing Co. and the Hill Publishing Co. have consolidated under the corporate name of the McGraw-Hill Book Co., with offices after July 1, at 239 West Thirty-ninth street, New York. This consolidation brings together two of the most active publishers of technical books in the country. The new company takes over the book departments of both houses with a list of about 250 titles, both industrial and college text books, covering all lines of engineering. It will continue as well the retail, importing and jobbing business of the two houses.

The officers of the new company are: President, John A. Hill; vice president, James H. McGraw; treasurer, Edward Caldwell; secretary, Martin M. Foss.

Mr. Hill is head of the Hill Publishing Co., which controls the *American Machinist*, the *Engineering and Mining Journal*, and *Power and The Engineer*. Mr. McGraw is head of the McGraw Publishing Co., which issues the *Electrical World*, *Electric Railway Journal* and *The Engineering Record*. Mr. Caldwell has been manager of the McGraw book department for several years and Mr. Foss manager of the Hill book department.

RAIL SALES.

(Special Telegram.)

New York, June 30.—The Carnegie Steel Co. reports rail sales as follows: Northern Pacific, 12,500; C., B. & Q., 800; Monongahela railroad, 800; Duluth, South Shore & Atlantic, 1,300; Erie, 5,500; miscellaneous, 1,000.

Leases Malleable Plant.—The Pennsylvania Malleable Co., Pittsburg, with works at McKees Rocks, Pa., has leased its plant to the Pressed Steel Car Co., which will operate it in the future. The Pennsylvania Malleable Co. has been an important manufacturer of malleable castings for railroad service.

BRISK MOVEMENT

of Iron Ore During June—Some Controversy About Licenses.

The point of interest in the general situation on the lakes during the past week has been the attitude of the Marine Engineers' Beneficial Association in relation to licenses. The law requires that the engineer's license shall be displayed on board while he is sailing. The Engineers' Association, therefore, to get a better hold on the men required that they deposit their licenses with the association. Quite a number of the engineers complied but later found it embarrassing when they wanted to accept positions. Obviously they were naturally diffident about going to the association rooms for them. A few gave orders for their licenses to the vessel owners, but President Yates of the Engineers' association ruled, after a few licenses had been returned in that manner, that the engineers would have to claim them in person. Since then, the association has refused to return licenses upon the written order of their owners. The matter has now been brought to the attention of the Steamboat Inspection Service and suits of replevin have been begun in some of the justice courts. The supervising inspector of the Detroit district has decided to issue certificates instead of licenses to those engineers who are unable to get possession of their property upon demand. The situation is annoying rather than serious; but it will probably be a long time before engineers voluntarily surrender their licenses again.

The movement of ore is brisk and June shipments will be over the 5,000,000 mark, the major portion being for the Steel Corporation, which has kept its own ships and a number of chartered ones actively employed. The coal trade, however, continues listless and it is difficult to get cargoes. The Pittsburg Coal Co. has scarcely begun as yet to ship to Lake Superior ports. There will be, however, a decided improvement in this trade in the near future.

The Anchor Liner Conemaugh was launched at the Wyandotte yard of the American Ship Building Co. on Thursday last in the presence of the members of the Society of Naval Architects and Marine Engineers who were much interested in witnessing the side launching method employed on the lakes.

The Illinois Steel Co. expects to blow in South Works stack No. 9 July 1 and South Works stack No. 7 July 15.

DEFECTIVE RAILS

Subject of Report at Opening of Testing Society Meeting.

(Special Telegram.)

Atlantic City, N. J., June 29.—Further investigations of defective steel rails were reported by Henry Fog, R. W. G. Wint and Robert Job at the twelfth annual meeting of the American Society for Testing Materials, which was opened here today at the Hotel Traymore. Many of the broken rail heads examined showed streaks of manganese sulphide, while slag was prominent in most of the fractured surfaces and it was found that cracks begin in and flow from one slag area to another. The slag was found to exist in various forms and when in the slope of a streak following the structure of the rail it was not considered dangerous, as the section in which this phenomenon occurred was bent through many degrees without showing indications of fracture. As a result of these investigations, it was again strongly recommended that steel rail specifications should provide: First, lower sulphur content; second, that more time be allowed from the addition of the ferro-manganese to the pouring of the ingot; and third, bottom pouring of ingots was recommended.

Variations in Coal.

At the opening session held this afternoon, the paper entitled "The Effect of the Various Constituents of Coal on the Efficiency and Capacity of Boiler Furnaces," read by D. T. Randall, provoked considerable discussion. It was reported that contrary to general belief, coal highest in moisture gave the best results, and grades lowest in moisture have the lowest heating value. Coals from various sections of one state also showed a wide variation in their constituents. For example, the volatile matter in one grade of coal mined in West Virginia is 17 per cent, and that taken from another mine in the same state is 37 per cent. The ash likewise showed a variation from 6½ to 8 per cent. Dr. C. B. Dudley said that no question is exciting more interest than the economical combustion of coal. The Pennsylvania railroad uses 30,000 tons per day and he ventured the opinion that the heating value of much of this is lost owing to poor firing.

Deciding on Standards.

A communication was received from W. F. Hillebrand, chief chemist of the United States Bureau of Standards, suggesting the co-operation of the society with the bureau in connection with the collection of material for standard samples. To obtain a standard sample of Lake Superior iron ore, Mr. Hillebrand will meet with the chemists of the United States Steel Corporation in Cleveland next week, and a meeting has been arranged with a committee representing the American Brass Founders' Association in Cincinnati in August for the purpose of deciding upon a standard bronze. The bureau has already taken over the distribution of cast iron drillings and is also furnishing acid and basic open-hearth steel drillings, these having recently been added. The appointment of a committee on sampling to co-operate with the Bureau of Standards was referred to the executive committee.

The annual address by the president, Dr. C. B. Dudley, on "Engineering Responsibility," presented at the evening session, aroused great enthusiasm, and the manner in which the subject was treated from the standpoint of both producer and consumer was very earnestly commended.

The first day's enrollment of more than 150 members is gratifying and foreshadows a record-breaking attendance at the meetings to be held later in the week. The report of the secretary, Edgar Marburg, shows a total membership of 1,160, a net gain of 145 during the year, the increase being 60 per cent greater than for either of the two preceding years. W. A. Bostwick and W. R. Webster were elected members of the executive committee, their terms expiring in 1911.

PERSONALS.

F. B. Richards, of M. A. Hanna & Co., Cleveland, will sail for Europe July 10, to be gone two months.

Malden Beard, formerly superintendent of the Livering Bros. foundry, Hanover, Pa., has been appointed superintendent of the Glenville foundry.

Fayette Brown, president of the Brown Hoisting Machinery Co., Cleveland, who was taken suddenly ill June 26, due to the severe heat, is steadily recovering.

John Baxter, superintendent of the tube mill of the LaBelle Iron Works, has been appointed general superintendent of the proposed tube mill to be erected by the Haselton Iron & Steel Co., for the Republic Iron & Steel Co., at Youngstown.

G. C. Fogwell has been placed in charge of the Philadelphia office of the Jones & Laughlin Steel Co. pending the appointment of a successor to Frank M. Campbell, who died at Van Wert, O., June 21. Mr. Fogwell was Mr. Campbell's assistant.

R. Grosvenor Hutchins has resigned as vice president of the Jeffrey Mfg. Co., Columbus, O., with which company he has been associated for 21 years. For a time at least he will hold membership in the board of directors, but expects eventually to retire altogether.

William A. Gutenkunst, president and treasurer of the Milwaukee Malleable & Gray Iron Co., has been appointed a member of the Milwaukee city civil service commission. He is a leading foundryman of that city, and formerly an alderman.

C. I. Togstad, superintendent of the Northwestern Steel & Iron Works, of Eau Claire, Wis., has resigned. He plans later to associate himself with a large machinery building concern at Milwaukee, Wis.

August Kittleberger, who for the past 15 years has been associated with the Clayton Air Compressor Works, has been engaged by the American Air Compressor Works as superintendent of their works in Brooklyn, N. Y.

OBITUARIES.

Jacob Bender, president of the Philip J. Bender Sons Corporation, machinist, New York City, died at his home in Yonkers, June 19, aged 50.

A cablegram to THE IRON TRADE REVIEW from Birmingham, England, June 28, announces the death of Richard Williams, aged 92, the oldest iron master in Staffordshire, England.

Madison H. Ball, formerly owner of the King & Walker foundry, Madison, Wis., died at St. Louis recently, aged 73. A number of years ago he was resident manager at St. Louis of the Park Bros. Co., manufacturer of black diamond steel.

James H. Blackburn, aged 81, father of W. W. Blackburn, secretary of the Carnegie Steel Co., died recently at Williamsburg, Pa. For years he was engaged in mining and shipping coal, ore and limestone in various parts of Blair county. He was active in public affairs and widely known throughout central Pennsylvania.

Thomas H. Carlin, aged 58, who up to a few years ago was actively associated in the business of the Thomas Carlin's Sons Co., Pittsburg, died in that city June 23. Mr. Carlin was a son of the late Thomas Carlin, who founded the business, but he retired a few years ago and devoted his attention to other lines of business. He was a member of the Engineers' Society of Western Pennsylvania.

STIRRING MEETINGS

HELD AT LEADING CITIES OF THE PACIFIC COAST

By Representatives of the National Association of Manufacturers and Other Organizations — Addresses by J. W. Van Cleave, Jas. A. Emery and J. P. Bird.

"The right of men to organize for the protection of their hours and wages and for the association of their interests is unquestioned, but this right exists only so long as the end which these organizations seek to accomplish is legal and just and the means employed to attain this end are also legal, fair, just and conducted with due and proper respect to the rights of other individuals." These words, pronounced by James A. Emery, form the pitch of the discussion at a mass meeting of the business men of Seattle, which was held at the Lincoln hotel, Thursday evening, June 17.

The discussion took place at the close of an informal dinner given under the auspices of the United Metal Trades Association of the Pacific Coast, the Manufacturers' Association, the Employers' Association and the Builders' Exchange of Seattle. Over 200 of the representative business and professional men of the city attended. The guests of honor were J. W. Van Cleave, recently president of the National Association of Manufacturers and president of Buck's Stove & Range Co., St. Louis, James A. Emery, counsel for the National Council for Industrial Defence and J. P. Bird, general manager of the National Association of Manufacturers. It may be safely said that no more able or masterly addresses on the problems of organized labor were ever before delivered in Seattle. J. M. Frink, president of the Washington Iron Works, was chairman of the meeting.

Mr. Van Cleave's Address.

Mr. Van Cleave was the first speaker. His remarks were a strong indictment of the methods and practices of the American Federation of Labor under the leadership of Samuel Gompers. He outlined in a concise manner the history of the now celebrated case of the Buck's Stove & Range Co. against the American Federation of Labor on account of the latter's boycott of the stove company's business. He pointed out how the labor leaders had repeatedly disobeyed the orders of the court and defied the laws of the republic. He declared these lawless and anarchistic tendencies to be the most dangerous features of unionism. "The union," said Mr. Van Cleave, "thinks that liberty is license. In my fight with the American Federation of Labor, I have used no weapon but the law; Gompers used methods that have been repeatedly condemned and rejected by the courts." Mr. Van Cleave declared that his fight was not against the rank and file of the laboring men but against their law defying and irresponsible leaders.

Work of Public Schools.

The work of the public schools in giving instruction in manual training was very highly commended by the speaker. He thought that this instruction should be particularly thorough in the grades where the boys range in age from 9 to 11 years and supported his statement with a quotation from Prof. Woodman, dean of the Washington University of St. Louis, who says that, if a boy of nine or ten is given instruction in practical manual training for one hour a day for four years and then put in a shop for one year, he will be a better mechanic than an apprentice who has been through four solid years of the ordinary routine commencing at 16 years of age.

"If the unions will be decent and eliminate their unlawful, criminal proceedings in order to enforce their rules, then all honest men will welcome them; but so long as they continue to defy all law and are led by such men as Gompers they have no place in this country," declared Mr. Van Cleave in conclusion.

Mr. Emery Speaks.

Mr. Emery followed Mr. Van Cleave with a comprehensive and brilliant address dealing with the fundamental principles and the development of combinations of wealth and combinations of labor. The latter, declared Mr. Emery, have no more rights or privileges before the law than any other individual or corporation. "The labor problem is the most intensely personal and the most intensely important problem that ever confronted the people of the world." The fundamental principle by which these labor combinations must be governed is that the rights of any individual or combination end where the equal rights of other individuals or combinations begin. The labor organizations of the country represent the minority of a class, less than one-fifth of one per cent of the laboring men of the nation. The aims of this minority organization are advanced by methods which are condemned by common law, statute law and the traditions which brought this nation into existence.

Mr. Emery made a vigorous attack on the principle of the minimum wage scale. "There can be no justice in giving an equal reward for unequal service in a nation built upon the theory of equal rights and opportunities of all." "Justice is obtained only when each man is rewarded according to what he can do," he asserted. "The purposes of the modern labor organization are to reduce men who have unequal abilities to an equal wage scale; to reduce the amount of each man's daily labor to the level of the slowest and most slothful workman; to say who shall learn a trade and who shall not and who shall have the right to work and where this right may be exercised, the obvious object of all this being to acquire a monopoly on American labor."

Mr. Bird concluded the program of the evening with a few well timed and convincing remarks outlining the scope, operations and purposes of the National Association of Manufacturers.

Meetings in Spokane and Portland.

Previous to the dinner at Seattle, similar meetings were held at Spokane and Portland under the auspices of the United Metal Trades Association and the local employers' associations. The Spokane meeting followed a luncheon at Davenport's cafe. The attendance was 150 and the president of the meeting was E. F. C. Van Dissel, president of the Phoenix Saw Mill, Spokane. The formation of a local manufacturers' association was strongly urged.

The dinner at Portland was presided over by Wm. H. Corbett, president of the Willamette Iron & Steel Works. The meeting was held at the Commercial Club and was attended by over a hundred business men from the lower Columbia river valley.

HYDRANT CONTRACT IS AWARDED.

San Francisco, June 22.—The board of public works has awarded the contract for furnishing 1,200 hydrants for the auxiliary water system to the Union Iron Works, at $119.74 each. There was but one other bid, and that much higher than the successful one. One condition in the contract calls for the hydrants to be made in San Francisco by resident mechanics. The condition is not in conformity with the charter, but the men holding political jobs had to yield to pressure brought to bear upon them.

SHORT WORK DAY

And High Wages Prevent Pacific Coast Concerns from Getting Contracts.

San Francisco, June 20.—The shorter work day for the men employed in the iron trades has come upon us quietly and without a ripple or a jar. The men work—that is, those who have work—eight hours and 30 minutes a day, minus, of course, the time it requires to get ready for the task, to prepare for the midday meal and to make ready to quit for the day. The men are happy because it marks the second installment of 15 minutes' reduction on the day's work, and more is to come in two installments of 15 each. If business continues as at present, the reduction may come, for there is not enough work to go around. The men rejoice over the shorter work day, without reduction of pay. That is one side of the picture. Here is the other in brief. Very few men at work, less than one-half of those employed two years ago, at the time the men went on strike; even those employed at present have no steady job, and are liable to be discharged at any time. Many mechanics are glad to secure work at that, though they have to work with their tools when required to do so, without additional pay.

The work has been diverted from San Francisco, when it was abundant, and it has not been brought back, in spite of the cheerful reports made. Speaking of the placing of an order for three ocean liners by the American-Hawaiian Steamship Co. with eastern ship builders, the president of the Union Iron Works Co., the most extensive plant of the Pacific, said that he could not successfully compete against eastern builders, because of the additional cost, shorter work day and higher wages.

Committees and deputations representing organized labor have made formal appeal to the municipal authorities on behalf of home patronage. The authorities are inclined to favor home industry, but must obey the provisions of the charter in letting contracts. The lowest and best bidder must be considered.

The board of public works opened the bids yesterday for 1,200 hydrants to be used in the auxiliary fire system. Two bids were submitted, both by local fabricators, at $119.74 and at $198.50 each, respectively. The contract will be awarded tomorrow.

The original plans for the proposed fire system will most likely be changed, and the duplex plan or interlacing system, will be adopted instead. The new plan will entail a much larger expense, but it has proved satisfactory in other large cities.

INCREASED ACTIVITY

In the Lake Superior Mining Regions—Heavy Shipments Being Made.

The Lake Superior mining district is showing the influence of improved conditions in the market with an increase in activity on all the mining ranges on the Mesabi range. While the work of the Oliver Iron Mining Co. has been delayed noticeably thus far, there is being shipped at present a tonnage of ore nearly equal to that sent down two years ago and it is expected that shipments for the season will equal those of 1907. The Steel Corporation is not only supplying its own fleet with cargoes, but has under contract a large number of boats operated by independent owners. The most important new mining projects of the Steel Corporation during the present summer will have to do with the opening of properties included in the lease from the Great Northern Ore Co. The Hill mine at Marble in the Canisteo district, the opening of which was begun last year, will not be in shape to ship any ore during the present season; and that portion of the Holman mine in the same district, which is included in the Hill lease, will be available for only a very small tonnage at best. It is understood that three or four new properties on the Western Mesabi are about to be opened up, so that by next year at least a substantial tonnage may be applied on the minimums required by the above lease. The Canisteo, Walker and Holman pits will ship this season in the neighborhood of 750,000 tons of ore. The washing plant which has been erected at Coleraine will handle a large part of this output.

The Euclid Mining Co. is prepared to ship from 50,000 to 100,000 tons from its property at Chisholm, and as this ore is of excellent quality and good iron content, it seems likely that the maximum will be taken. The same interests operating this mine have sunk a shaft northwest of the Kinney mine, and with the completion of a spur into that property, will be prepared to ship some 50,000 tons. This mine is known as the Seville. The Shenango Furnace Co. is also opening a large property adjoining the Seville. Among other new properties to be opened, are two or three under lease to Pickands, Mather & Co. It is reported the sinking of a new shaft on the old Scranton mine near Hibbing will be undertaken. This property was shut down because of excessive water, and there is likelihood of a concrete shaft being required to again open it up. On the other ranges there is a marked increase of operations as compared with last year. Among others, the Traders' mine, which was idle all of last year, will be operated and orders were issued a week ago to pump out the property and resume mining operations at once. The interests mentioned recently as having in charge the old Volunteer mine in the Marquette range, and some Mesabi range options, have incorporated under the name of the Virginia Mining Co., the capital stock being $100,000 and the incorporators Thomas F. Cole, Frank W. Heimick, G. A. Tomlinson and Joseph B. Cotten, all of Duluth.

WILL BUILD FACTORY.

St. Louis, June 25.—The Handlan-Buck Mfg. Co., through its president, A. H. Handlan, has purchased 70,000 square feet of ground at the northwest corner of Rice and Gratiot streets, upon which it will erect a factory building to cost about $300,000. The company manufactures railway supplies. The new building will be a factory and warehouse, modern in all respects, and constructed to meet the requirements of the company, which has outgrown its quarters on Third street, near Olive. The new building site has a frontage of 426 feet on Gratiot street and 210 feet on Rice street, extending to the Missouri-Pacific railway tracks. The land purchase price was $60,000.

May Exchange Bonds.—The Susquehanna Iron Co., which took over the properties of the old Susquehanna Iron & Steel Co. at foreclosure, Aug. 1, 1907, has notified the holders of the 6 per cent bonds of the Susquehanna Iron & Steel Co. that they can exchange their bonds for a new 6 per cent five year bond of the Susquehanna Iron Co. The latter company has created a new mortgage in the amount of $300,000, in which the bonds offered in exchange are issued. The new company has paid the coupons on the old bonds which fell due several years ago.

The W. K. Henderson Iron Works & Supply Co., Shreveport, La., has let the contract for the construction of a concrete building, 80 x 151 feet, to be used as a foundry, which will replace the present frame structure. Additional machinery will be installed.

ANNUAL REPORT

Of Dominion Iron & Steel Co., Made Favorable Showing.

Toronto, Canada, June 26.—The annual meeting of the shareholders of the Dominion Iron & Steel Co. of Sydney, N. S., was held at Montreal June 17. The annual report showed a profit after payment of all expenses except interest, and after setting aside the necessary appropriations for sinking fund, exhaustion of minerals and depreciation of plant, of $2,225,834. Interest charges amounted to $654,422 incuding interest on floating debt entailed by litigation, leaving a net surplus of $1,571,412. The payment of $2,750,000 by the Dominion Coal Co. in settlement of the dispute between the companies leaves a balance of $1,201,092 still to be adjusted, but of this sum only $392,496 has been taken into account in making up the books to May 31. The directors have taken advantage of the readjustment to appropriate $1,800,000 of the speial contingent account provided in connection with the claim against the coal company for the reduction of the property and construction account, leaving a balance of $2,099,801 to be carried forward to next year. A report by Frank Merrick, an expert, on the company's iron ore beds at Wabana, Newfoundland, estimates that the land area contains 17,750,000 tons and the first submarine area 90,650,000 tons, a total of 108,400,000 tons. No account is taken of the second submarine area, it being at present impossible to form any idea of the quantity or quality of the ore. The cost of mining is likely to remain so low that the ore can be mined to yield a handsome profit either by converting it into pig iron, or selling it in the open market.

President J. H. Plummer stated that the ore could no doubt be sold at a profit of about $1 per ton and that a fair estimate of the value of the ore area would be from $13,000,000 to $15,000,000. He referred to the plans for extension of the plant, which could be vigorously pushed forward now that the dispute with the coal company was settled. A new blast furnace would be built, new coke ovens and a finishing mill erected, and by the time these were completed there would be a market for the increased production.

The new issue of $20,000,000 consolidated mortgage bonds was authorized. President J. H. Plummer is sailing for England in connection with the new bond issue.

GLOBE IRON CO. IMPROVEMENTS.

The Globe Iron Co., Jackson, O., has recently completed a number of important improvements at its furnace plant and has also acquired some extensive tracts of coal and limestone lands which will render it independent, so far as raw materials are concerned, for a long period. Improvements at the furnace include an additional Foote stove, 18 x 75 feet, making four now in place, a new bell and top rigging and additional pumping equipment. This stack is run on high silicon product and, with one brief stop for overhauling, has operated steadily through the depression.

The company has recently secured several hundred acres of coal lands located near the furnace and has opened a shaft to the vein, which averages about 4 feet in thickness and is down about 100 feet. This mine is equipped in a very complete manner, machine mining being exclusively employed. Motor hau'age is now being installed, and this will give the company every economy of which the mine is possible. By extensive drilling on the Globe properties, sufficient coal has been proven up to run the furnace for a long period of years. A switch slightly less than a mile long connects the mine and furnace; this is also the property of the company.

In connection with the Star Furnace Co., extensive lime deposits have been opened on a 360-acre tract a few miles south of Jackson and shipments are now going forward. These properties are equipped with crushers, rock drills are employed in the quarries, and the buggies are run to the cars for loading entirely by gravity. Both quarry and drift methods are followed. Besides limestone of a superior quality, the properties contain considerable iron ore, coal and fire clay.

WILL BUILD ADDITIONS.

Worcester, Mass., June 26.—The Atlas Jewelry Co., Fall River, Mass., will erect a new factory 35 x 80 feet. It will start with 25 to 30 hands, but hopes to increase the number to about 200 hands eventually.

The E. Ingraham Co., Bristol, Conn., will build a five-story brick addition to its plant, 38 x 136 feet.

The Carlisle-Johnson Machine Co., Manchester, Conn., has moved from Hartford and will commence work in its new quarters at once. The company manufactures friction clutches and marine reverse gears.

The American Brass Co., Waterbury, Conn., announces that it will give its employes a Saturday half holiday during June, July and August, those working 55 hours per week receiving pay for 60 hours.

PROFITS MADE

By U. S. Pipe & Foundry Co. in 1908-9 Earned in the Last Three Months.

The United States Cast Iron Pipe & Foundry Co. has issued its report for the year ended May 31, which compares as follows with that of the previous year:

	1909.	Decrease.
Gross income	$184,354	$453,264
Other income	90,377	46,280
Total income	$274,731	$499,544
Interest on bonds	90,000	
Net earnings	$184,731	$499,544
Reserve	27,782	*15,782
Balance	$156,949	$515,326
Pfd. dividend	218,750	656,250
Deficit	$ 61,801	$140,924
Com. dividend		250,000
Deficit	$ 61,801	$390,924
Prev. surplus	225,921	405,880
Surplus	$164,120	$ 14,956
Imps. in lieu of depreciation		163,051
P. & L. surplus	$164,120	*$148,095

*Increase.

As has been noted, the action of the directors in declaring a dividend of 1¾ per cent on the preferred stock payable Sept. 1, 1908, the payment of which had been restrained by a New Jersey court, has been declared legal by the court of errors and appeals. This dividend will be paid July 2, to holders of preferred stock.

In presenting the report President George B. Hayes said:

On the 31st of May of this year your company completed the first ten years of its corporate existence. By reference to the annual statement which has been made to you from year to year you will observe that during this period the total net earnings have been as follows:

Total net earnings from March 31, 1899, to May 31, 1909, $10,936,702. This amount has been disbursed as follows: To thirty-one dividends on the preferred stock, $5,625,000; to dividends on the common stock, $1,125,000; total dividends, $6,750,000. To expenditures out of earnings, for new buildings, equipment, and tools, $1,608,378; to reservation to secure doubtful accounts, $64,204; to reservation for insurance fund, $100,000; to reservation for additional working capital, $2,250,000; to undivided profits now on profit and loss account, $164,120; total, $10,936,702.

During these ten years the manufacturing capacity of the company has been greatly increased. The physical condition of the plant, tools and properties are better than ever before. The total loss for all these during the entire period of ten years does not exceed six-tenths of one mill.

During the fiscal year closing May 31, 1909, business has not been good. The industrial depression which began in October, 1907, continued during the major portion of the year, and your company has suffered with others in the same general line of business. I may say, however, that all profits shown ended May 31, 1909, have been made in the last three months, and that during the past three months there has been a noticeable increase in business. We hope it will continue and on its continuance depends the payment of dividends. That, however, the incoming board of directors will determine.

Old directors and officers were re-elected.

SPECIAL FITTINGS

Designed for Baltimore's Proposed High Pressure System.

The decision of the city of Baltimore to use lap-welded, open-hearth steel pipe, together with special cast steel fittings in the installation of a high pressure fire system, was arrived at after exhaustive experiments conducted by D. B. Banks, consulting engineer for the city, and Prof. Carpenter of Cornell university. The contract was awarded the Pittsburg Valve, Foundry & Construction Co., of Pittsburg.

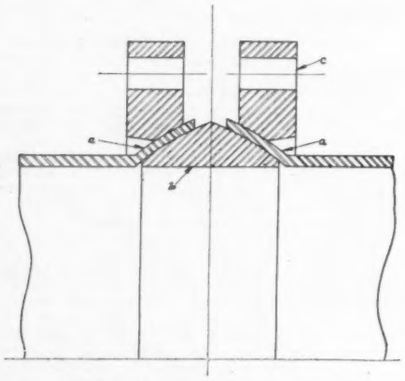
It is the intention to provide an interconnected system of 10-inch, 16-inch and 24-inch pipes with 8-inch branches to the fire plugs, independent of all other water service, i. e., no water is to be taken from these pipes for street cleaning or any other purpose except for fire protection.

The special pipe joint was designed with the following points in view:

To provide against electrolysis by making the electrical conductivity of the joint approximately equal to that of the body of the pipe.

To be sufficiently elastic to remain tight under all conditions of service, such as strains coming from expansion and contraction due to temperature changes, settlement of the ground, or even the washing away of a portion of the ditch underneath the pipe.

To permit of offsetting the pipe in order to clear obstruction, and to conform to irregularities in the ditch without the use of special angle pieces.



THE PROPOSED JOINT.

After a great deal of experimenting a joint was designed and adopted by Mr. Banks as best fulfilling these conditions, a cut of which is shown. The pipe is expanded at the ends (a) to form true spherical zones, a cast iron ring (b) exactly fitting these zones is placed between the pipes and the pipes securely clamped together by means of steel flanges (c).

No gasket or compound is to be used to make the joint between the pipe and ring.

At points along the lines where fire hydrant connections are to be taken off this is to be done by means of 8-inch necks welded to the mains. All the steel pipe and joints will be dipped in a hot mineral rubber solution, heated at a temperature of 400 degrees which gives a coating to the metal of 1/32 of an inch in thickness. The purpose of this coating is that it gives more lasting qualities to the pipe, prevents rust and provides an insulation against electricity.

The fire hydrants are to be of an entirely new design and will embrace the following features:

They are to be made so that the pressure in the main will tend to close the hydrant and will be operated from the side.

They will be of the post type normally provided at the upper end with an ornamental cap which is to be removed and replaced when hydrant is in use by a service head containing the necessary regulators, safety valves and stop valves.

The gate valves are to be of the well known parallel wedge type, as manufactured for years by the Pittsburg Valve, Foundry & Construction Co., for the severe and exacting steel mill service of the Pittsburg district. They will be fitted with steel bodies, semi-steel tops and discs and fully bronze mounted. The 16-inch valves will be geared and the 24-inch valves will be geared and by-passed. The 24-inch valves in the pump house will also be fitted with cylinders for operating them.

CHANGES IN AUSTRALIAN CUSTOMS REGULATIONS REGARDING MACHINERY AND TOOLS.

The Australian customs regulations have been changed so that the following machinery and tools are dutiable at 25 per cent ad valorem, unless of British origin, in which case the duty is 20 per cent ad valorem:

For metal working: Arbor or mandrel presses, bending elbows for gutter and stove piping, bobs or wheels (leather), polishing for lathes, boring and drilling (horizontal), calking and chipping machines, chuck set with drills, copying lathes (for metals), cornering and punching, cropping, cutter-making, chucks for lathes (excepting drill, independent jaw, scroll and special chucks, free), cutting (tooth wheel or gear), drilling (radial), finning, flanging, forging, groover or dado head, guards (saw bench), keyseating, lathes, under 12 inch center, milling (other than Universal), nail-making, nut-making, nut-finishing, planing, plates (lathes face), profiling, punching bars, punching and cornering, riveting, rivet-making, cold iron (for cutting cold iron), saw bench, shaping (12 inch and under in stroke), drill sharpeners, straightening, threading and boring tools, washer making, hydraulic wheel presses and screwing machines (other than bolt screwing and nut tapping). Bolt screwing and nut tapping (combined or separate), adapted to accommodate sizes to cut over 2 inches only.

For paper finishing, cutting and folding:

Bending and creasing, cutting (label, lever, millboard), damping, knives for paper cutting machines, also power stripping machines, similar to card cutting machines.

For wood working: Boring, carving, copying lathes, double spindle shaper, dovetailing, fretwork, being sawing, hub borers, joining, lathes, mortising, molding, panel planer thicknessing, patent door sticking machine, planing, rounding saw frame double equilibrium (a machine tool for re-saw'ng and cross-cutting, also for sawing two deals at once), sand papering, saw brazing, saw sharpening, spoke-making, surfacing, tenoning, tongueing and grooving, trying-up, wheeling-making lathes, also veneer-cutting.

The following tools and machinery have been re-classified and are now subject to a duty of 15 per cent ad valorem regardless of origin:

Machine tools, metal working: Wire netting machine, pneumatic hammers, other than hand pneumatic hammers, steam hammers, up to and including sizes up to 16 inches cylinder; punching and shearing machines, combined or separate, sizes up to ¾ inch, slotting machines, sizes up to 12 inch stroke; centering machines to center up to 6 inch diameter, bolt screwing and nut tapping, combined or separate, sizes above ⅜ inch and up to 2 inch. Also adapted to accommodate sizes to cut over 2 inches, bending rolls in sizes to bend up to ¾ inch plate.

Tinsmiths' tools, 15 per cent ad valorem regardless of origin.

The Driggs-Seabury Ordnance Corporation, Sharon, Pa., has decided upon erecting a large addition to its machine shop. The new building will be of brick and steel construction. 100 x 200 feet. Wm. B. Scaife & Sons Co., Pittsburg, will fabricate and erect the structural steel for the addition.

ENGINEERING RESPONSIBILITY—AN INQUIRY AS TO CAUSES OF FAILURE AND METHODS OF IMPROVEMENT

Presidential Address Delivered by Dr. Chas. B. Dudley Before the American Society for Testing Materials at Atlantic City, June 29

Few fields of study are more fruitful of results and lead to more genuine progress than a study of the causes of failures. Such studies may be unpleasant and disagreeable, they may at times be even disheartening, but the man who would make substantial advances must heed the lessons which his failures teach. It is true that valuable information can be obtained likewise from a study of materials which have given successful service. And ofttimes, when attacking a new problem, a comparison of the properties and characteristics of those parts of a structure which have behaved well in service with the characteristics and properties of those which have failed in the same service, is a most satisfactory method of approach. And yet, it is doubtful whether the study of failures does not give the more positive information. Faraday, who spent his life in experiment, used to say that he learned more from his failures than he did from his successes. And it is not difficult to see why this should be so. When an experiment or a construction has proved successful, we are naturally most interested in the result, and do not usually spend time and thought and study over the details which have led to our success. On the other hand, if our experiment or construction is a failure, the cause of the failure is immediately sought for, every detail is questioned, and it is this study of the details which broadens our knowledge. Quite in line with Faraday's statement is the rather more homely phrase, with which you all are doubtless familiar, and which we remember to have seen somewhere in engineering literature, that "the scrap heap is the place to learn."

Who is Responsible?

Closely connected with the query as to the cause of failures is the ofttimes more important question, who is responsible for the failure? If the matter in hand is an experiment which we are making for our own information, the question of responsibility is small and is practically swallowed up in the cognate question of the cause of the failure. But if, on the other hand, the failure involves the loss of human life or the destruction of valuable property, the question of responsibility may be very grave. And if we may trust our observation, the location of the responsibility for failure is not always an easy matter. I remember to have heard a former editor of *Harper's Magazine* say in a public lecture: "The general habit of humanity is to throw the teaching of the sermon over into the adjoining pew and keep practically none of it for ourselves." Much the same way is it with responsibility for failures. With each and all of us it is usually the other fellow and not ourselves that should be held accountable. In view of the situation it has occurred to us that it might not be amiss on this occasion to spend a little time over the cause of, and responsibility for, failures in engineering constructions.

In our studies of failed and broken parts in connection with our work at Altoona for now some years, we have been gradually led to ascribe failures to one or more of the four following causes, viz., to bad material, bad workmanship, bad or faulty design or to unfair treatment.

Bad Material.

Let us spend a few moments with each of these possible causes of failure. First, bad material. This does not cover those cases where the wrong kind of material was used or material not adapted to the work. If cast iron is used when steel should have have been employed, if the steel is brittle when the service requires tough, tenacious metal, this is no fault of the material. Failures due to the employment of material unfitted to the service come under another category. Nor can the material be blamed if the size of the part which fails is too small. This cause of failure also comes under another category. But material is bad, and may justly be charged with being the cause of failure when it is different from what those who put it in service had a reasonable right to expect it to be. A rail with a bad pipe in the head, an axle made from a badly segregated bloom, a piece of concrete in which the materials are improperly mixed or contain not enough or inferior cement, are all examples of bad material, and if failure comes the failure may justly be charged to the material.

Factor of Safety.

The query may naturally arise here, ought not the factor of safety employed to be sufficient to care for the uncertainties of material, so that the total output of a works could be made use of in service. We once knew an officer of a steel works who wanted to have one grade of steel used for all purposes, and who, when told that car axles made of that grade of steel would not be strong enough to hold up the load, replied, "use more of it; that is, make the axles bigger." Undoubtedly there is a necessary relation between the factor of safety and some of the uncertainties of manufacture, but it can hardly be allowed that the producer should then throw upon the consumer all the uncertainties of material. We cannot help thinking that our definition of bad material is sound, viz.: Material is bad when it is different from what those who put it in service had a reasonable right to expect it to be. If the material is bought on specifications, it is reasonable that it should be what the specifications call for. And even if it is bought on indefinite, verbal or written order, such material should be supplied as the buyer had a reasonable right to expect would be furnished.

But why is there ever any difficulty between the producer and consumer about material? The price is agreed upon when the order is taken and the quality of the material is either specified or understood. Why, then, does not the producer always furnish good material?

Price Factor.

Our experience on this point has brought us face to face with several explanations of the difficulty we are considering. First and perhaps most important is the price. It is constantly urged that the consumer will not pay the price requisite to secure the materials desired. No information is usually given as to how far the wished-for price, requisite to secure such good materials as the producer would like to furnish, covers a desire for

large profits, and consequently consumers have always been a little slow in attaching much weight to this excuse. Prices are largely determined by competition, and in the absence of something more than a verbal statement from the producer that better materials would be furnished at a higher price, he would be a bold purchasing agent that would pay the higher rate. On the other hand it is undoubted that competition is the antagonist of quality, and where materials are bought without reasonable specifications rigidly enforced there is unquestionably much weight in the contention of the producer.

Another Excuse.

Another reason or excuse for poor materials is that processes and methods of manufacture do not always and every time yield the desired first quality product. Strive as the manufacturer may, the works always turn out some material that is inferior. Taking one illustration from the steel industry, it is well known that every heat is not equally as good as every other, and that a part of each ingot is inferior to the remainder of it. Of course, all of this inferior part that cannot be sold must necessarily remain as scrap, to be worked over again, with the result that the manufacturing cost of the marketable product is necessarily increased. Hence the tendency to crowd the limits and force upon the purchaser all the merchantable material possible, even though some of it may be inferior. It is fair to say that there is a good deal of human nature in this phase of our subject, and if only those of us who are without sin are entitled to cast stones we greatly fear very few stones will be thrown.

Functions Usurped.

Another and most pernicious excuse for furnishing bad materials is the attempt so common everywhere on the part of producers to usurp the legitimate functions of both the consumer and his expert. This manifests itself in the statement, so commonly made by those furnishing material, that it is good enough for the purpose, thus arrogating to themselves the right to decide not only how the material shall be made, but also what kind of material the consumer and his engineer shall use. Pernicious though this custom may be, a good deal may be said in palliation of it. The practice is the outgrowth of an historical situation. In the earlier days, when the consumption of materials was only a fraction of what it is at present, the producer of any material was supposed to know not only how to manufacture it, but also its characteristics and how it would behave in service, and consequently consumers who in those days had scarcely begun to study for themselves the behavior of materials in service, naturally turned to the manufacturers for counsel as to what materials to use. This practice is still in vogue, and it is to be confessed that, where it is employed, no legitimate criticism of the producer can be made if he urges that the material is good enough for the purpose. On the other hand, as time progressed, and large consumers began to study for themselves the behavior of materials in service, as they began to employ their own experts, as testing machines and laboratories began to increase, as, indeed, a society for testing materials came into existence and knowledge of the properties and characteristics of materials began to widen, it is evident that the situation has changed and that where materials are bought on definite specifications, the voice of the producer as to quality is no longer potent, and that the old excuse for inferior materials, that they are good enough for the purpose, is no longer entitled to consideration or weight. We are entirely ready to allow that the study of materials, during both the process of manufacture and their behavior while they are in service, is a legitimate field of activity for both producer and consumer, and, as is well known, we have persistently urged with all the force that we were capable of, that while specifications are being made there should be the heartiest co-operation on the part of both; but the specification having been decided on and the contract placed in accordance therewith, there really seems to be very little room left for excuse for furnishing materials that do not meet the requirements, because they are, in the judgment of the producer, good enough for the purpose.

Desire to Make Money.

We intentionally refrain from discussing that excuse for poor materials which has its foundation in an overweening desire to make money, since it is so clear that the producer who does not give a reasonable equivalent for the money that he receives must necessarily have a short business life. We are quite ready to acknowledge that no hard and fast line can be drawn between quality and continued business success, and yet we fancy few will deny that the man who sells inferior, worthless or adulterated materials which do not give satisfaction at the price of good ones, will have serious difficulty in securing a second or third order for the same kind of goods. In our own experience, and, let it be stated modestly, partly as the result of our own tests, a number of firms who formerly did quite large business with railroads have either gone out of existence or have been forced to seek business in other fields than those which they formerly cultivated with such unfair profit to themselves.

Bad Workmanship.

Coming now to the second cause for failure in structures, bad workmanship. That bad workmanship is a far too frequent cause of failures is common experience. The tendency to slight the job is almost universal. A rivet or a bolt is left out, with consequent increased strain on those which are actually put in, a forging does not fill out the pattern, or the metal is burned, or a weld is defective. We knew a case once where the construction on a passenger coach involved the safety of human life, and where the drawings required that there should be two nuts on a bolt and the end of the bolt riveted over. After the cars had been in service a few weeks and some minor repairs were being made, it was discovered that the bolts originally used in a number of the cars were too short, that the second nut only grasped one or two threads, and that the remaining space in the nut had been filled with putty, so manipulated and stained as to give the appearance of the riveted end which the drawings called for. We know of another case where two ends of a gas pipe in a small house were joined with putty, instead of with the well-known sleeve or thimble. Fortunately the odor of the gas from a slight leak in the defective joint led to its discovery and repair before anything serious happened. There is little doubt that the experience of each of you will furnish quantities of cases of bad workmanship, and we have known engineers who did not hesitate to declare that bad workmanship was the principal cause of failures in service.

Is There Excuse?

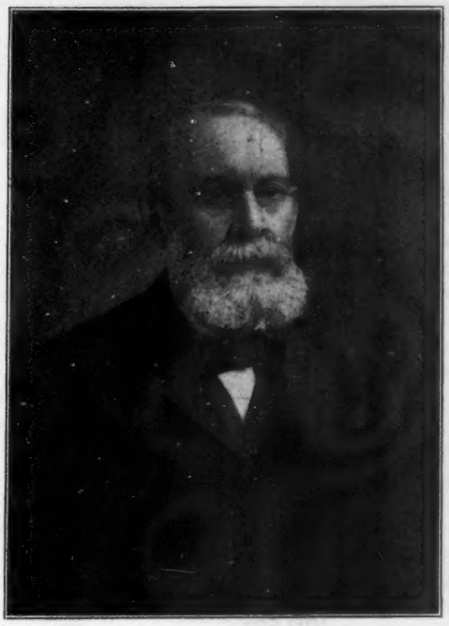
Those of you who have frequently been brought into contact with the results of bad workmanship have no doubt, like myself, often wondered why work was so badly done. Not infrequently in contemplating a failure in which bad workmanship played an important part, we have said to ourselves, "there was absolutely no

Two Urgent Needs of the Day

More Research and More Conscientiousness

Extracts from Presidential Address of Dr. Chas. B. Dudley before the American Society for Testing Materials

The truth is we are using materials in construction without sufficient knowledge. There is crying need for experiment. Testing machines adequate to cope with some of the problems which now confront engineers do not exist. We are increasing sizes and constantly building larger structures. The factor of safety everywhere is largely a guess. We can not help feeling that no better use could be made of some small fraction of the millions that have been accumulated by individuals in connection with our great industries during the past half century than in the establishment of a Bureau of Engineering Research. Who will avail himself of this magnificent opportunity?



The producer of material is anxious to secure the largest possible amount of successful output and the greatest possible amount of reward therefor. The consumer wants to limit this by restrictions as to quality, and to obtain the material at the lowest figure. The workman's interest is to secure the maximum of pay for the minimum of effort, and in this struggle it may perchance happen that the quality of work suffers. The employer's interests are clearly the reverse of the workman's and so on. The foundations of these diverse interests are, of course, very deep, and with the present organization of society, it is not easy to see how they are to be obliterated or their antagonism neutralized. But we beg to make one suggestion. Would not an infusion of genuine conscientiousness into our industrial life bring an amelioration? If a little less energy was expended in the mad race for wealth and a little more zeal manifested in maintaining the rugged virtues of honesty, integrity and fair dealing, would not some of the friction and contention of our present commercial life disappear? We must all live together, and surely harmony is better than contention. There are some things in life of more value than money.

excuse." And yet since workmanship is so important an element in our theme, it may not be amiss to go a little deeper into the matter. Every one will recognize lack of skill, general inefficiency and simple plain laziness as important elements in bad workmanship. But since these are indivdual characteristics it probably would not yield any valuable results to discuss them. It is true the apprentice system or lack of apprentice system which is characteristic of many trades might, perhaps, justly be blamed for lack of skill, but it would lead us too far to consider this point.

(To be continued in our next issue).

EXPOSITION HAS SURPLUS.

The financial report of the Cleveland Industrial Exposition shows that a net surplus of $30,000 was realized. Of course if the enterprise had been carried on as a money-making project this would be a poor financial showing, but inasmuch as it was only hoped from the beginning that the exposition would not be a financial loss, the showing is remarkable. This surplus is the result of solid co-operation on the part of all concerned in the big affair.

AMONG MACHINERY MAKERS.

CINCINNATI.

Past Two Months Show Gradual Improvement—Plant Moving.

Office of THE IRON TRADE REVIEW,
First National Bank Building, June 29.

Reports concerning business in the machine tool district indicate that the month of June is slightly better than May, and as May was somewhat better than April the record of the past two months shows gradually improving conditions. While all of the plants visited do not report a gain in business this month, there are enough evidences of improvement to establish the fact the foundries are busier and the orders for machine tool castings are increasing. Some of the shops are adding to their working forces and several of the large plants are now running full time. The outlook is favorable for at least as much business during the summer months as we are now getting, while the indications for fall business are decidedly encouraging. Correspondence regarding purchases in a number of instances has resulted in the buyer holding off until fall, and there is considerable of this deferred business which manufacturers believe will develop into orders during the last quarter of the year. There is apparently less inquiry from automobile makers for tools and the demand is becoming more scattered, indicating a general call from manufacturers of all kinds. One large car building plant has made some purchases during the week and is considering further purchases of machines, which is encouraging as indicating some improvement in railroad demand. A large engine building concern in Indiana bought three lathes in this market during the week, and this order developed the fact that one large plant was out of the particular sizes wanted and could not make prompt delivery. The call for heavy types of machines, notably large planers, continues to lag and the increase in activities is mainly in the lighter lines and smaller tools. The demand for shapers is only moderate. Lathes are selling more freely than other types of machinery. The portable drill makers are mostly busy, with some concerns behind on orders. Milling machines are in good demand with dealers urgently calling for deliveries. Light sensitive drills are enjoying a good demand.

Increased operations in the shops are bringing up the question of the supply of good mechanics. A number of employes of the shops here have secured good positions with automobile manufacturers and there is apprehension that as the business expands in machine tools there may be some difficulty in securing old employes who have gone to work in the automobile shops.

The Peck-Williamson Co. is dismantling its plant at Hamden Junction, O., and moving it to Oakley. The company purchased a site at Oakley about two years ago. The buildings are being taken apart and moved with the equipment and it is expected that the work will be completed and the foundry ready for business in five or six weeks. The company states that the cause of the removal was owing to inability to get protection for its men during a strike at the plant. The plant gave employment to about 130 men and boys.

PITTSBURG.

Railroads Ordering Equipment Placed in Condition for Service.

Office of THE IRON TRADE REVIEW.
510 Park Building, June 29.

With a fair current run of business which is on the increase and with better prospects for the future, the condition of the machinery market is such that makers are very much encouraged and are anticipating a heavy fall business. A new spirit is working its way into practically all lines of equipment manufacture or dependent industries, with the possible exception of some of the jobbing foundries, the trade of which is usually among the last to show improvement from a business revival. The railroads are ordering more idle equipment to be placed in readiness for service and this is resulting in more active shop operations, and some increase in machinery buying. The Pennsylvania lines east have only recently sent out orders that 400 idle locomotives be prepared to go into commission by July 1. There is not much buying of machine tools by the railroads as yet, but general machine shops are sending in more orders. Pneumatic tool makers report some excellent bookings in their line. The ingot mold and roll shops in this district are enjoying very favorable conditions of trade.

The Mesta Machine Co., Pittsburg, has closed with the Canonsburg Steel & Iron Works, Canonsburg, Pa., for a 57-inch Holander barometric condenser to be installed in the latter's plant. Officials of the Mesta company state that their business is expanding very steadily and that much improvement has been shown during the past several months.

The Inter-Ocean Steel Co., which is erecting a new plant at Chicago Heights, Ill., for the manufacture of steel tires, etc., has recently been awarding a number of contracts for equipment. Some of the machinery will be furnished by the Morgan Engineering Co., Alliance, O. Julian Kennedy, Pittsburg, is the engineer in charge of construction.

Wm. B. Scaife & Sons Co., Pittsburg, manufacturer of the Scaife and We-Fu-Go water softening, purifying and filter systems, has completed an addition to its present plant at Oakmont, Pa., to accommodate its increased business in the building of systems for the purification of water for steam boilers, industrial and domestic uses. The following is a list of recent orders taken: Fox River Paper Co., Appleton, Wis., 1,875-horsepower We-Fu-Go system; Pittsburg-Buffalo Co., Burgettstown, Pa., 1,000-horsepower We-Fu-Go system, third order; American Sheet & Tin Plate Co., Vandergrift, Pa., 15,000-horsepower We-Fu-Go system, twentieth order; Pennsylvania Salt Mfg. Co., Natrona, Pa., 5,000-horsepower We-Fu-Go system, second order; Eastman Kodak Co., Rochester, N. Y., two 6,000 gallons per hour mechanical gravity filter systems, third order; Verner Coal & Coke Co., Bulger, Pa., 1,200-horsepower We-Fu-Go system; Warwick Iron & Steel Co., Pottstown, Pa., 6,000-horsepower We-Fu-Go system; Youngstown Sheet & Tube Co., Youngstown, O., 8,000-horsepower We-Fu-Go system, second order; Fuchs & Lang Mfg. Co., Rutherford, N. J., 500-horsepower siphon system; New England Butt Co., Providence, R. I., 300-horsepower Scaife automatic system.

In connection with its new tin plate plant at Aliquippa, Pa., the mills for which have just been ordered, the Jones & Laughlin Steel Co. is planning the erection of a power plant which will drive this mill. The power plant will be distinct from the main plant, which will operate the steel works proper at Aliquippa. The equipment for the new

plant has not yet been ordered, but will be placed very soon.

Plans are being prepared for the extension of the plant of the Isabella-Connellsville Coke Co., at East Riverside, Pa., where the company will sink two coal shafts and later will build a large coke plant. Geo. S. Baton, of Pittsburg, is the engineer in charge of the improvements.

The increased use of oil as fuel for open-hearth furnaces is illustrated by the order just placed by the Midvale Steel Co. with Tate, Jones & Co., Inc., general offices, Pittsburg, for Kirkwood oil burning equipment for open-hearth furnaces. This is the third large order received by the Pittsburg company for this character of equipment for the Midvale company.

CLEVELAND.

Improvement Continues, Especially in Foundries and Forge Shops.

Office of THE IRON TRADE REVIEW, Browning Building, June 29.

The past week shows evidences of improvement in general conditions. Manufacturers of drop forgings seem to take the lead in the actual amount of business done and in most cases are approaching their 1907 records. Orders for large machines are few and far between, but the demand for smaller types of machinery is fairly good. Although in many lines it might seem as though business were not increasing consistently with the advancement of better times, still it must be remembered that the annual summer slump in various lines is about due. The consensus of opinion among local manufacturers is that the fall months will bring a decided improvement in every line.

Wyman & Gordon, manufacturers of drop forgings, report an unusual run of business. For some time past the concern has been operating at full capacity, but owing to the filling up of its order books it has been found necessary to run a night shift. Even under these conditions this company is hesitating to book further orders.

Among orders recently filled by the Cleveland Planer Works Co., were a 48-inch and a 30-inch planer; also several smaller machines for the Strong, Carlisle & Hammond Co., a local concern.

The National Iron & Wire Co. has just closed contracts for the erection of shops for the National Electric Lamp Co., The Cleveland Foundry Co., and the Duty Brick Co., Collinwood, O. About 3,000 tons of structural material will be used in the three buildings. Up to a short time ago, this plant had been running day and night, but now the company reports a decrease in business to warrant the discontinuing of the night shift, for a short time at least.

The Bowler Foundry Co. reports an increase of 25 per cent in June business over that of May. This brings the actual melt of this company up to that of the corresponding month of 1907.

The Peerless Automatic Machine Co., manufacturer of the Peerless automatic multi-spindle screw machine described elsewhere in this issue, is receiving more orders than it can take care of with its present equipment. An extension of its plant is being planned and the concern will soon be on the market for a full line of planers, drill presses, boring mills, grinders, in fact a full shop equipment.

The Ferry Cap & Set Screw Co. has been enjoying unusual prosperity for these times of business depression. Not very many months ago this concern doubled its capitalization and increased its equipment to handle ¾-inch stock, where formerly it was limited to sizes up to ½-inch. The company is farther behind on its orders than ever before, and the prospects are that within the near future an extension of the plant will be a necessity.

The Hill Clutch Co. is making extensive improvements about its plant, many of which are designed to improve the surroundings of the workmen. The shops are being treated to a coat of whitewash throughout and lockers are being installed for the workmen. The company has recently undertaken the manufacture of cut gears and machine molded gears. Owing to increased volume of business, it has been found necessary to nearly double the size of the tool room.

W. C. Bruce, president of the Bruce-Macbeth Engine Co., states that inquiry for gas engines with producer gas plants is very decided and that the outlook in this line is most promising. During the past few days this company booked the following orders for gas engines: 30-horsepower engine for the Delmont Restaurant Co., Buffalo; 30-horsepower engine for the King Edward Hotel Co., Buffalo; and 50-horsepower engine and producer for the Light & Water Co., New Windsor, Md.

The Wellman-Seaver-Morgan Co. is preparing for shipment to the Inter Ocean Steel Co., Chicago, a battery of eight Hughes mechanical stoking continuous gas producers.

MILWAUKEE.

Machine Shops and Foundries Steadily Increase Number of Employes.

Milwaukee, Wis., June 28.—"We are adding to our force as rapidly as competent workmen can be found," is the statement of officers of the South Side Steel & Malleable Casting Co., Fourteenth and Windlake avenues, which reflects better than probably anything else the conditions that obtain in Milwaukee among machinery manufacturers and foundrymen. It is gratifying to note that the increase in the force is necessary because of the rush of orders and not simply in anticipation of prosperity. The South Side company has completed the construction of an all-steel cupola house and a 10-ton cupola, at a cost of $4,000. As business picks up enough a modern power plant will be erected at a cost of $5,000, to provide electricity which will replace the present steam power. The work force now numbers 300, an increase of nearly 100 in two months. The South Side company has just been awarded a large contract for the manufacture of the Stenger automatic coupler for threshing machine outfits and similar purposes, for W. J. Stenger, of Mohall, N. D., the patentee.

The Fred M. Prescott Steam Pump Co. is ready to take possession of the addition, 50 x 100 feet, to the foundry. The company is now operating at normal capacity in all departments.

R. J. Preiss Co., West street and Dover place, has awarded contracts for the erection of a $20,000 factory for the manufacture of bed springs and metal couches, at Hillside lane and Thirty-seventh street.

L. P. Feustmann, vice president of the Power & Mining Machinery Co., at Cudahy, while in this city last week spoke of plans under way for extensive improvements at the big plant. Mr. Feustmann said that the company plans to make the Cudahy plant one of the most important of the many it is operating when it completes the improvements. "I am confident that the conditions of trade in the United States and Europe warrant the expenditure we are to make," said Mr. Feustmann.

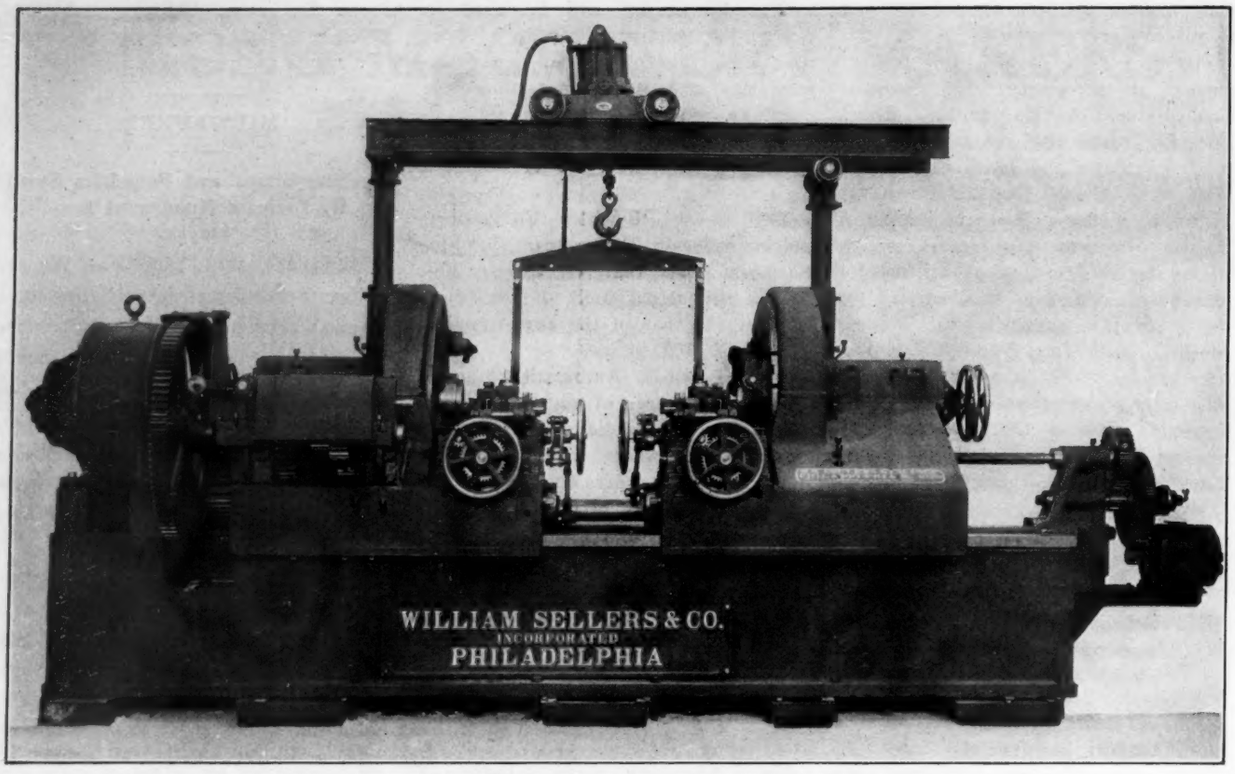


FIG. 1—FRONT VIEW OF SELLERS CAR WHEEL LATHE.

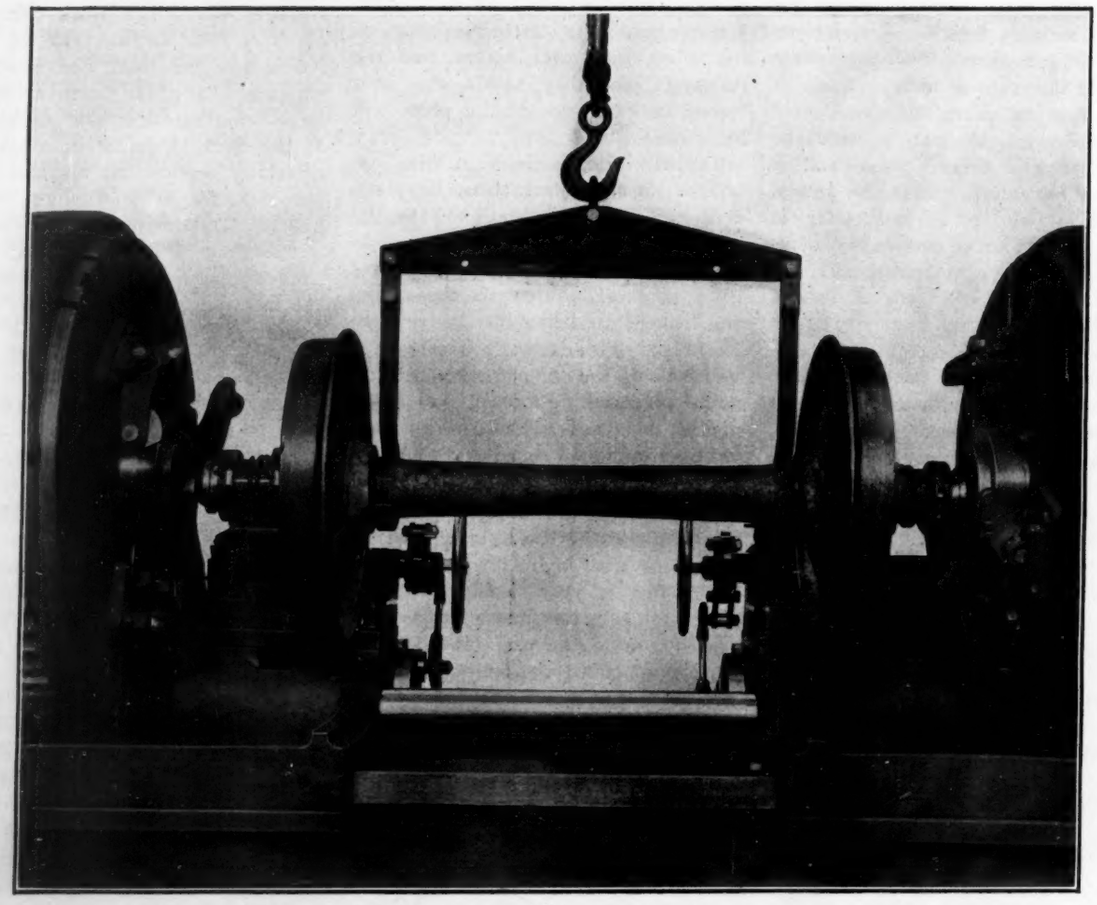


FIG. 2—REAR VIEW OF SELLERS CAR WHEEL LATHE.

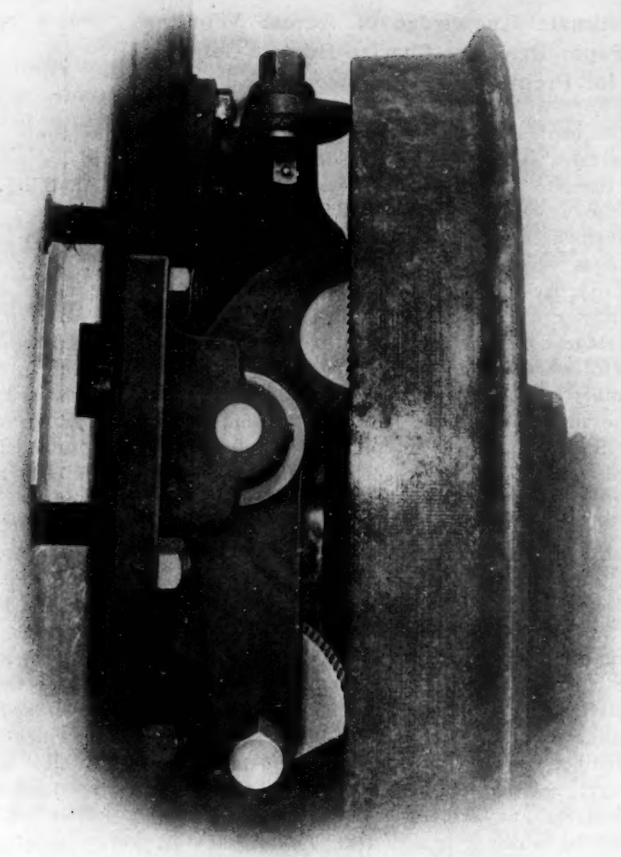


FIG. 3—ENLARGED VIEW OF DRIVING TOGGLE.

THE SELLERS CAR WHEEL LATHE.

THE IRON TRADE REVIEW is now able to present illustrations of the Sellers car wheel lathe, the demonstration of which was noticed in the issue of May 20.

Fig. 1 is a front view of the machine complete. It will be noticed that the right hand head, including the tool rests, is bodily adjustable longitudinally on the bed of the machine by means of the geared screw shown. The wheels are centered by means of clamping bushings carried in a sliding spindle within the sleeve in the head. The bushings are taper fitted to the spindle and center the wheel by the bearing surface of the journals. This, it will be seen at once, trues the wheel by the bearing regardless of the centers in the axle.

Fig. 2 is a view from the rear with a pair of wheels finished ready for removal. In this view the movable head has been shifted to allow of the removal of the wheels and axle. The illustration also exhibits the clamping bushes previously referred to on the axle journals.

Fig. 3 is an enlarged view of the driving toggle, which fully explains their operation.

The lathe is designed for turning all kinds of steel car wheels or wheels with steel tires from 28 to 42 inches in diameter. It should be noted that in our issue of May 20, the time records given are minutes and hundredths, and not minutes and seconds, as might possibly be inferred. The lathe was operated on the trial by Wm. Anthony, of the Reading railway, by courtesy of H. D. Taylor, superintendent of motive power. The machine is very fully illustrated and described in catalog No. 440 issued by William Sellers & Co., Inc., Philadelphia.

The LaCrosse Plow Co. last week shipped a carload of plows to Buenos Ayres, Argentina, for use in connection with gasoline traction engines. This is the fifth carload shipped to the republic this year.

TIN PLATE PLANT OF JONES & LAUGHLIN.

Considerable significance in the tin plate market accompanies the action taken last week by the Jones & Laughlin Steel Co. in awarding contracts for its tin plate plant at Aliquippa, Pa., since it will bring a new and important factor into this branch of the iron and steel industry. The company has placed with the Standard Engineering Co., Ellwood City, Pa., the contract for building 10 hot mills and a corresponding number of cold mills. The plans of the company call for eventually a plant of 30 mills, but the first unit is all that will be completed at this time. The work of construction upon the new plant will be pushed rapidly and the mill will be rolling tin plate as soon as possible, but this will scarcely be before some time in 1910. The Jones & Laughlin Steel Co. is now at work at its Keystone shops, Pittsburg, upon the fabrication of the structural steel required for the mill buildings, and this erection work will also be done by the company.

In the course of time, the tin bars for the new tin plate plant will be supplied from the steel works at Aliquippa, which will include sheet and tin bar mills in its complement of equipment. The tin plate plant will be ready for operations, however, before this capacity is provided, and accordingly it will temporarily draw its steel supply from the South Side works, Pittsburg.

No other finishing mill awards for Aliquippa have yet been made, but the Fort Pitt Bridge Works, Pittsburg, has been given the contract for the erection of the pit furnace building in connection with the steel works.

COAL AND COKE TONNAGES INCREASE.

Coal and coke tonnages handled by the leading railroad systems continue to increase. The report of the Pennsylvania Railroad Co. on the shipments of coal and coke originating on the company's lines east of Pittsburg and Erie, for the week ending June 19, shows a total of 1,025,763 short tons divided into 205,444 tons of coke, 743,760 tons of bituminous and 76,559 tons of anthracite coal. The shipments of the corresponding week in 1908 were 882,741 short tons. The total movement this year to June 19 on shipments originating on that part of the company's system shows a total of 23,431,309 short tons, compared with 20,823,260 short tons during the same period in 1908.

PRACTICAL WORK FOR COLLEGE PROFESSORS

Necessity of More Intimate Knowledge of Actual Working Conditions Urged in Paper Read by Charles Buxton Going at Convention of Society for Promotion of Engineering Education

The following is an abstract of a paper read at the meeting of the Society for Promotion of Engineering Education in New York, June 25, by Charles Buxton Going, managing editor *The Engineering Magazine:*

Our schools of applied science have been—and are—so splendid in their achievements that criticism is ungrateful, and may seem captious; but if it must be offered, it would seem to be that they, in turn are over-academic. The prevalent belief that the engineering graduate is "too full of theory"—that he must have a considerable supplementary training in minor "practical" positions before he can be trusted to work out results which will be economically valuable—would seem to indicate that his training has failed to include recognition of some important elements in the problems he is supposed to have been taught to solve. For the shortcoming suspected is not simply his comparative inexperience. There are no backstairs to the treasury of knowledge gathered through years of contact with all kinds of undertakings under all kinds of conditions, and nobody expects the technical schools to discover or to build any. The fear is not as to the height or elaboration of the structure of the education they afford, but as to the inclusive scope of its foundations and as to its perspective. The belief, in short, is that the school is out of close parallel with life.

Many Courses

I realize most clearly that any such criticism as I have just offered can apparently be immediately disposed of by citation from the catalog of almost any large engineering school. The number and diversity of courses that may be found therein would seem to indicate a close observance of almost all the ramifications of engineering work and the survey and construction of an educational pathway closely following each. What, then, is the meaning of the criticism which I have implied? It is qualitative rather than quantitative. To put it baldly, it is that the subjects all too often are not taught as they must be practiced.

Two Main Causes

For this condition, if it exists, I think there may be two main causes. The first is, the persistence of the natural tendency to cling to old forms and methods of education or to change them as little as possible in applying them to new subject matters. That is the way in which the world usually introduces its great changes, even changes which are destined ultimately to prove revolutionary. The first railway carriage was a sort of glorified stage coach body hung on a new style of wheels. It took two-thirds of a century to evolve the Pullman coach, the air brake and the M. C. B. coupler. Steam at sea did not venture to discard spars and sailing vessel lines, nor to commit itself to hulls designed properly for screw propulsion, until after nearly a half century of experiment. Up to the time of our Civil War and even later, the battleship differed from the merchantman chiefly in the number of decks and guns with which it was equipped; a little more than a quarter century has covered the specialization of the battleship as a wholly distinct genus. The university has not yet had as long as this to adapt its form and structure to the new power by which it is actuated. I do not know what the technical school of 1950 may be, but I venture to think that it may differ more, organically and functionally, from the technical school of today than Columbia School of Mines and the Massachusetts Tech differ from Oxford and Cambridge of 1850.

Fear of the Commercial

Most unfortunately, so far at least as concerns university teaching of a subject like engineering, the good old academic temper has always been fearful, if not intolerant, of anything utilitarian—or, to use frankly the more objectionable word, of anything commercial. It is traditional that a German professor has been known to thank God that no one could by any possibility ever make any use of his subject. I, personally, heard the German-trained incumbent of a teaching chair deplore the wretched necessity of having any students at all at the university; it interfered so with the professor's opportunities for research and meditation. If my observation and interpretation of phenomena are correct, some lingering vestiges of this old mood (a fine one in its own proper place, but now persisting out of place) have made our technical schools reluctant to recognize and to teach economic limitations as clearly as scientific standards of perfection. It has been said that anything is feasible in engineering if it is within the laws of nature; the question whether it is advisable is determined by the law of dividends. The engineer, whose function it is to carry works of construction or production to practical success, ought to be competent to plot accurately the curve along which the forces behind these two systems of law are in equilibrium; the complaint is that his schools give him too academic a devotion to the one and an inadequate idea of the imperative character of the other. Theoretical standards of construction and theoretical figures of performance are idealized in his philosophy, and the ideals are not sufficiently balanced by a knowledge and appreciation of costs, and of the fact that there is always a point, varying with every case, beyond which further refinement toward the ideal spends more than it saves and so becomes a vanity of perfection—a professional mistake.

Element of Cost

It is not for a moment desirable that the vision of the goal set by pure science be obscured, but only that the understanding be increased of the approximations which it is expedient to accept in actual performance, and the conditions by which they are determined. Everyone must wish the student of mechanical engineering to possess sufficient knowledge of the science to understand what has been done and to take an intelligent part, if necessary, in continuing it. But the choice of power plant in any given case depends on a careful comparison of the net total of interest on investment, expense of maintenance, depreciation, wages of skilled attendants, and fuel costs. The design of a piece of machinery may require a sound, scientific knowledge of mechanics and kinematics, a careful mathematical calculation of stresses and weights, and a high degree of skill at the drawing board. But if cost of construction is important—and it usually is very essential—it requires also attention to economy in the use of the material and especially of the labor involved in manufacture; the selection of stock sizes; the standardization of gears, arbors, bores, tapers, bolts and screws; avoidance of diffi-

cult problems in pattern making and molding, and minimization of labor in machining and assembling of parts. Does the average course impress the student with these common-sense considerations in the handling of materials as strongly as it does with theoretical mechanics or the technique of draftsmanship? Can it possibly do so, until the economics of engineering are given an entity in the curriculum, and made to occupy an arc of the educational horizon as large as that which they will fill in the graduate's discovery of his life work?

Practical Experience

Yet the very analogies I have cited would prove that this evolution of the scientific school to exact adaptation to its environment would proceed with reasonable rapidity were it not for the second obstructive influence at which I have hinted. This is the jealousy of the universities which make them debar the members of their faculties from mingling in practical affairs. This situation becomes like that which might result if the merchant marine companies or the navy department discouraged their deck officers from familiarizing themselves with the use of steam. While the colleges have been unable to offer rewards large enough to compensate an able specialist for resigning independent work in his profession, they have discountenanced or discouraged his combining outside practice with university service. It is vastly to the credit of our professors that in spite of this disadvantage they have maintained so active and earnest an interest in all contemporary developments; but without the competitive participation and the daily intercourse that constantly sharpens the edge of the consulting engineer's knowledge, the college man is almost of necessity prevented from maintaining more than an academic familiarity with the broad range of subjects he is expected to teach. His assistants, further, upon whom the students must depend chiefly for personal instruction and individual contact with their technical work, are usually drawn—and by budget necessity must be drawn—from a class of men whose experience is scarcely a step in advance of that of the undergraduates themselves.

Some Suggestions

Now, criticism which is not constructive fulfills only half a function. Let me attempt the dangerous service of suggestion. A traditional institution of the universities is the professor's Sabbatical year, in which he is supposed to travel and to familiarize himself with the work done in his subject elsewhere. Suppose that, recognizing the relatively high rate of progress in the applied sciences, these Sabbatical periods in the technical faculties were reduced to five years, or, better still, to three; and that the teacher were required to spend each third or fifth year, *not* in sojourning at other universities, working in other laboratories, hearing other lectures, and seeing how his subject is *taught*—but in active work as an official or attache in a railway organization, a bridge or construction company, or a manufacturing plant, seeing how the things he teaches are actually *practiced*. Salary would be immaterial, as his full income from the university would be continued; opportunity for the widest and closest possible contact with work in the field under "all the conditions there are" would be everything. I owe the completion of this concept to the active executive manager of one of our largest manufacturing corporations. His enthusiastic approval of it goes far to indicate the cordial cooperation that would be given by business interests in making such a plan operative. To them it would bring not only the valuable aid of the university man's trained faculties, but the prestige of association with colleges of high standing and repute. To them, also, would soon accrue another advantage in the higher usefulness of the graduates turned out from the college to enter industrial or engineering service. To the professor would be opened the most fertile and most instructive working and research laboratories where experiments on a full-sized scale, backed by an endowment such as he never could dream of controlling, were spread before him in full operation 24 hours of the day. And think of the assured grasp of the latest ideas and methods, the freshness of viewpoint, and the energy of demonstration with which each man would return to his classes after a year in the field. This would be a sort of university extension that would keep engineering education and engineering practice in intimate communion and in constant parallel.

A Bold Policy

Columbia has now struck out boldly on a new policy, introducing courses on works management, works design, shop transportation, and handling of materials, conducted by specialists in active practice who bring into the lecture room the atmosphere and viewpoint of actual professional life. Indeed, within their powers, the chairs most closely allied to the subject in several universities have tried to incorporate at least some of these elements in their scheme of work and lectures. Worcester makes an interesting and praiseworthy exhibition of manufacturing conditions as nearly as they can be reproduced in the school shop. Stevens shows a lively appreciation of the business elements in engineering work, and of the necessity that the technical graduate shall perceive them. Harvard has launched a school of business administration of comprehensive scope but not as a part of the engineering faculty. The Cincinnati experiment may also be referred to, and there are other partial instances deserving high credit. But the field is too large to be cultivated adequately with the facilities usually afforded.

Fundamental Attitude

In so far as any lack of proportion or of balance may exist in the resultant of the present technical courses, it is probably due to a disposition so admirable that one hesitates to call it a defect—that is, the passion for thoroughness actuating every member of the faculty, each in his department. But, after all, I do not know that what we teach is so important as how we teach it. The question is not so much of the functional performance of our engineering schools as of their organic constitution. Are we doing the best that can be done, or all that should be done, to establish right relations between the faculty and the profession, and between the student and the faculty, or to introduce the student to the atmosphere, the viewpoint, the fundamental attitude and spirit of his life-work?

Cloister and Cell

Although engineering, whether static or dynamic, demands organization more nearly like the military form than any other civil occupation, our engineering courses try to mold men for this most active and energetic pursuit by methods inherited from the cloister and the cell. We make laboratory, shop and field scarcely more than an annex to lecture-room and study. We assume to a very large extent that a system excellent for teaching theology, the classics, letters, and perhaps pure mathematics, will serve for teaching railway engineering, superintendence of a power plant, or shop administration, by the mere change of text books and of topics discoursed upon from the lecturers' platform. We attempt to develop that

"objective, synthetic" habit of mind of which I spoke some time ago by a mode of training evolved to reach the ideal of a subjective, analytical mentality. It takes our students some years of after training to learn to be something more than analytical and critical and to get down to do things. In short, the boy entering Annapolis or West Point steps at once into the life of the navy or the army and becomes a part of it. His graduation is merely a step forward in the same direction. The boy entering one of our engineering schools usually steps into something totally *unlike* an engineering corps, a manufacturing shop or the motive power department of a railway. His graduation is a plunge into a strange and bewildering stream moving in a new direction, in which he must find a new foothold and new orientation.

Working With Alumni

The change, therefore, that I think will bring us nearer to truth is not one of detail; it is fundamental. It cannot be accomplished easily. Nevertheless, somewhere in that direction, I think, lies the way to the great technical school of the future. We shall begin to work towards it when we devise some plan by which our engineering teachers will live nearer to our practicing engineers. We will grow nearer to it when, in our schools of applied science, a closer fellowship is established between "town and gown." The jealousy of many universities, which discourages the teacher from maintaining close touch with active professional work, as already suggested, is one of the regretable influence forcing our practical science courses out of parallel with the progress of industry. A more weighty one still, perhaps, is the small opportunity given the alumnus to be heard in university councils and to bring back within university bounds the fresh spirit and suggestion of the constantly changing world without. The result is an inevitable set toward formalism and scholasticism on one side, and toward apathy on the other. Through freer, wider, and more frequent intercourse between faculty and alumni, probably more effectually than in any other way, will the evolutionary forces of the wonderful system of technical education be kept fresh, vigorous and instantly responsive to the demands of industrial life.

Employers' Requirements of Technical Graduates.

A most interesting paper on employers' requirements of technical graduates was read by Hugo Diemer, professor of mechanical engineering at Pennsylvania State College. Prof. Diemer stated that in order to ascertain what qualifications were most desired in graduates from a course in mechanical engineering, he addressed a circular letter to 720 manufacturers in Pennsylvania, and 30 manufacturers outside of the state, great care being taken to select only manufacturers whose operations would naturally involve the employment of mechanical engineers. To the 750 letters sent, responses were received from 283 employers, of whom there were 161 who had not employed technical graduates and did not expect to; 95 of the 283 had employed technical graduates.

The first question asked was: "What personal qualifications as to character and temperament should an applicant possess, aside from technical preparation?" The largest number (25) demanded good habits and clean manhood; the next largest (20), steadiness and application, and the third largest (17), obedience to superiors, disposition to submit to discipline and to receive directions in an agreeable manner.

The second question asked was: "What technical studies would best equip a candidate to best fit your needs?" The answers indicate that the general lines of studies in mechanical and electrical engineering represented the technical instruction that is desired by most employers. It was noticeable that many laid stress on applied mechanics and chemistry, especially the chemistry of iron. Several replies include structural design.

To the third question: "What general non-technical studies would best equip a candidate for your needs?" a great preponderance of answers covers business practice and methods, system and cost keeping. Emphasis was also placed on the teaching of English.

The fourth question was: "Have you been an employer of technical graduates heretofore? If so, have you found them satisfactory?" This question was answered by 98 of the 102 who had employed technical graduates, and the answers indicated that 60 had proved satisfactory while 15 cases are classified as doubtful and 22 as unsatisfactory.

The fifth question was: "In what particular have you found them most deficient?" The answers to this question show greater unanimity than those to any of the other questions, and may be summarized as follows:

"Do not appreciate their lack of practical knowledge, nor the facts of the knowledge of the (to them) uneducated men. Unwilling to continue practical shop experience long enough. Unwilling to start at bottom and obey orders. Do not understand that they must begin at the bottom and that their education should make them better climbers instead of putting them at the top right away."—(45.)

"Exaggerated idea of the immediate value of their services. Too impatient to get ahead. Want to be managers before they have learned the details."—(14.)

"Lack of understanding of bearing of technical data on everyday work."—(6.)

"Lack of resourcefulness and of applying elementary principles in solving problems."—(6.)

"Lack of application."—(4.)

"Lack of knowledge of value of time."—(3.)

"Lack of common sense."—(3.)

"Lack of knowledge of rudiments of business practice."—(3.)

"Lack of knowledge of good English."—(3.)

"Inaccurate in numerical work."—(2.)

"Lack of system."—(1.)

"Too anxious to get into testing department."—(1.)

"Characterized by a crazy desire to get into designing department."—(1.)

A particularly noticeable feature of the returns from those manufacturers who answered the form letter was the fact that so large a proportion accompanied the return form by a cordial letter indicating their approval of the investigation and their willingness to co-operate.

Increased Capital.—The stockholders of the Berger Mfg. Co., Canton, O., voted unanimously at a special meeting, June 19, to increase the capital stock from $2,000,000 to $5,000,000. The purpose of this increase is to provide for additions, extensions and improvements to keep pace with the growing demand for their various products. A larger output will be secured and the volume of business greatly increased. One of the first improvements will be the erection and enlargement of warehouse and shipping facilities, so that all orders may be promptly executed and a much more complete stock carried at all times.

The decision of Vice Chancellor Howell has been affirmed by the New Jersey court of errors and apeals, upholding the right of the United States Cast Iron Pipe & Foundry Co.'s directors to pay a dividend of 1¼ per cent on preferred stock, which was declared July 2, 1908, from the fund termed "reserve for additional working capital."

THREE CYLINDER, TWO STAGE, STEAM DRIVEN AIR COMPRESSOR

One of the Largest Enclosed Type Machines Ever Built

We present herewith illustrations and description of an extremely interesting design of air compressor which, aside from the general arrangement, possesses a number of mechanical features which are certain to be of more than passing interest; in fact, it is an excellent example of how much can be got into a limited space and yet without sacrificing convenience and accessibility. A number of features are new, but the whole design is one of the most satis-

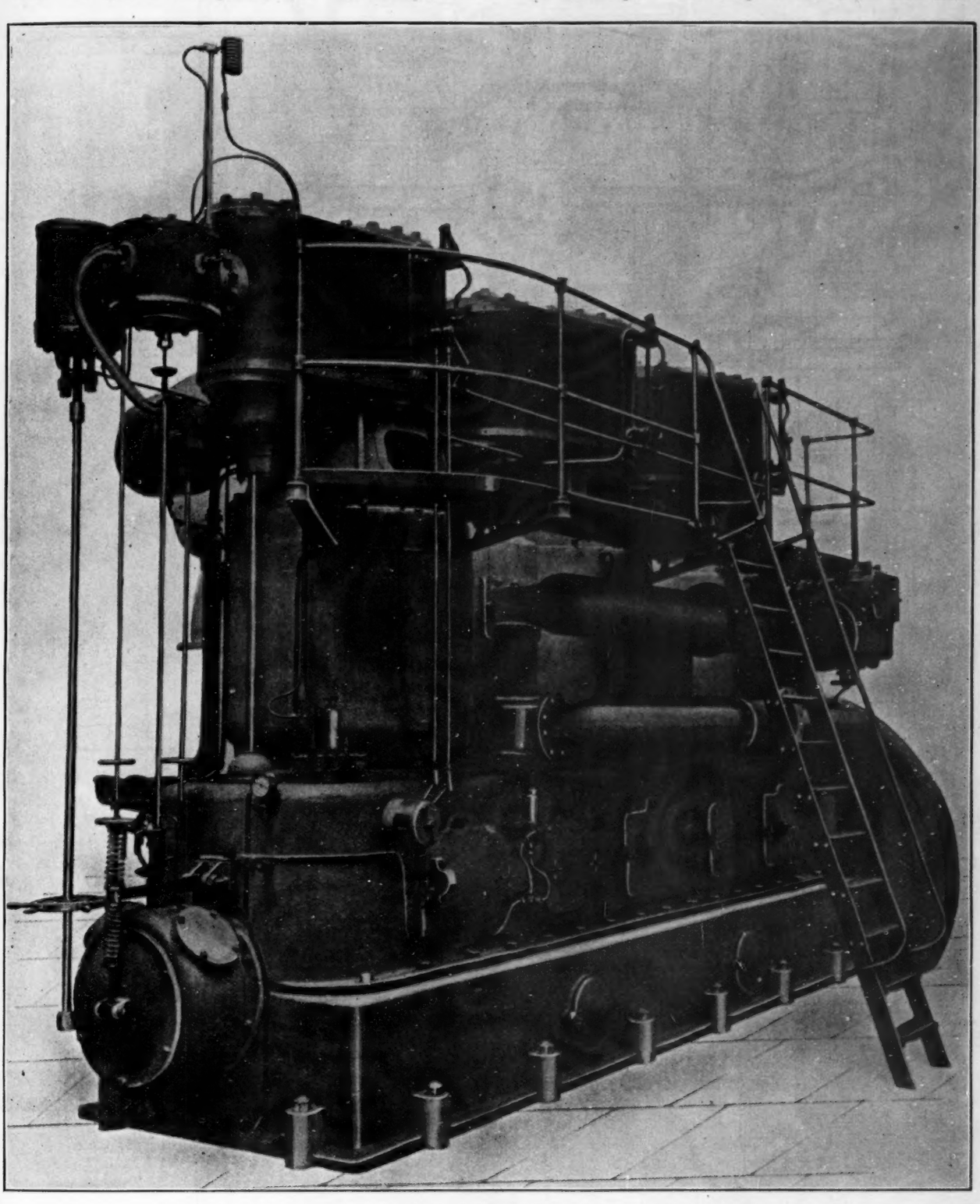


FIG. 1—TWO-STAGE, STEAM-DRIVEN AIR COMPRESSOR FOR SOUTH AFRICA.

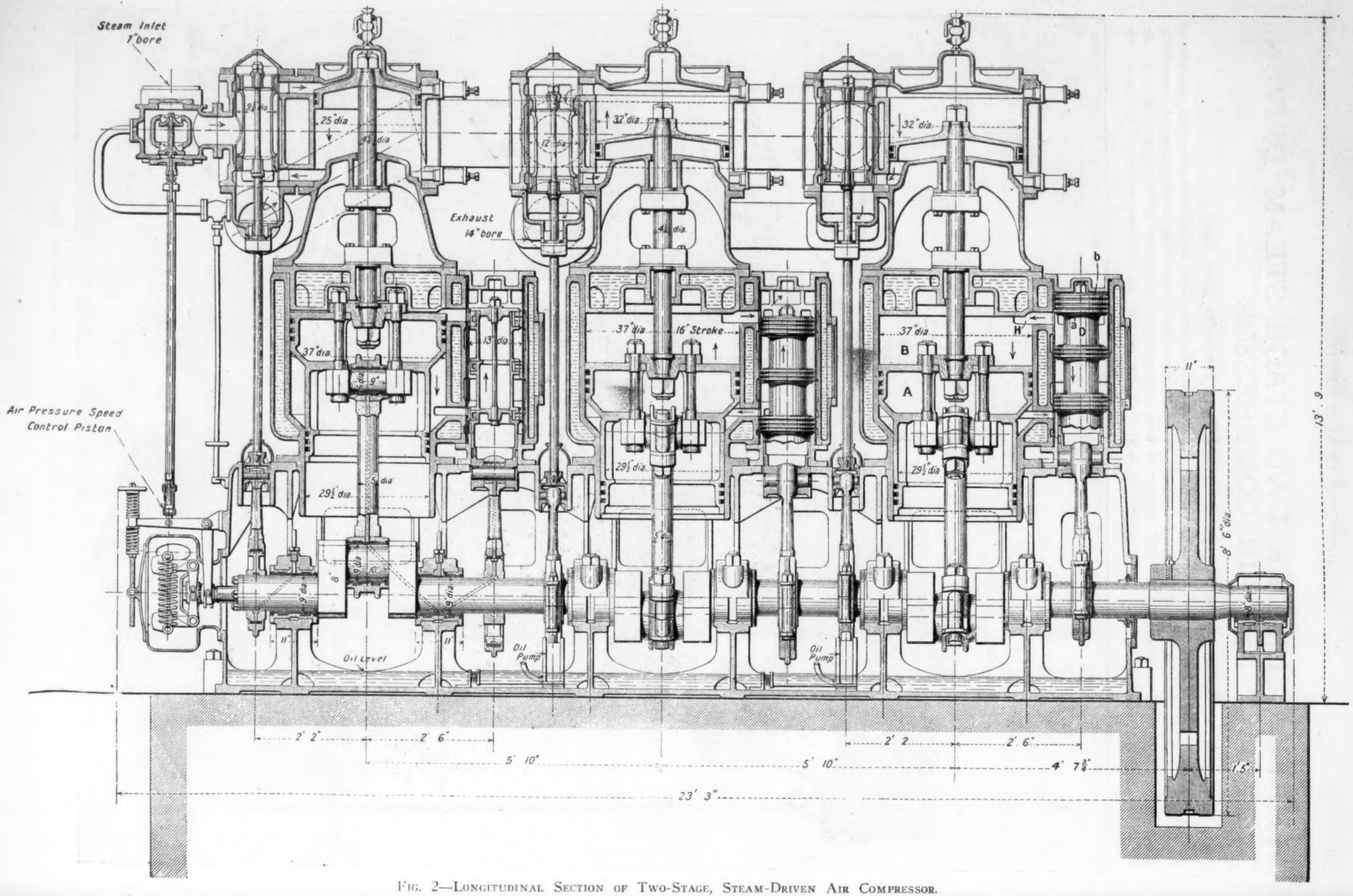


FIG. 2—LONGITUDINAL SECTION OF TWO-STAGE, STEAM-DRIVEN AIR COMPRESSOR.

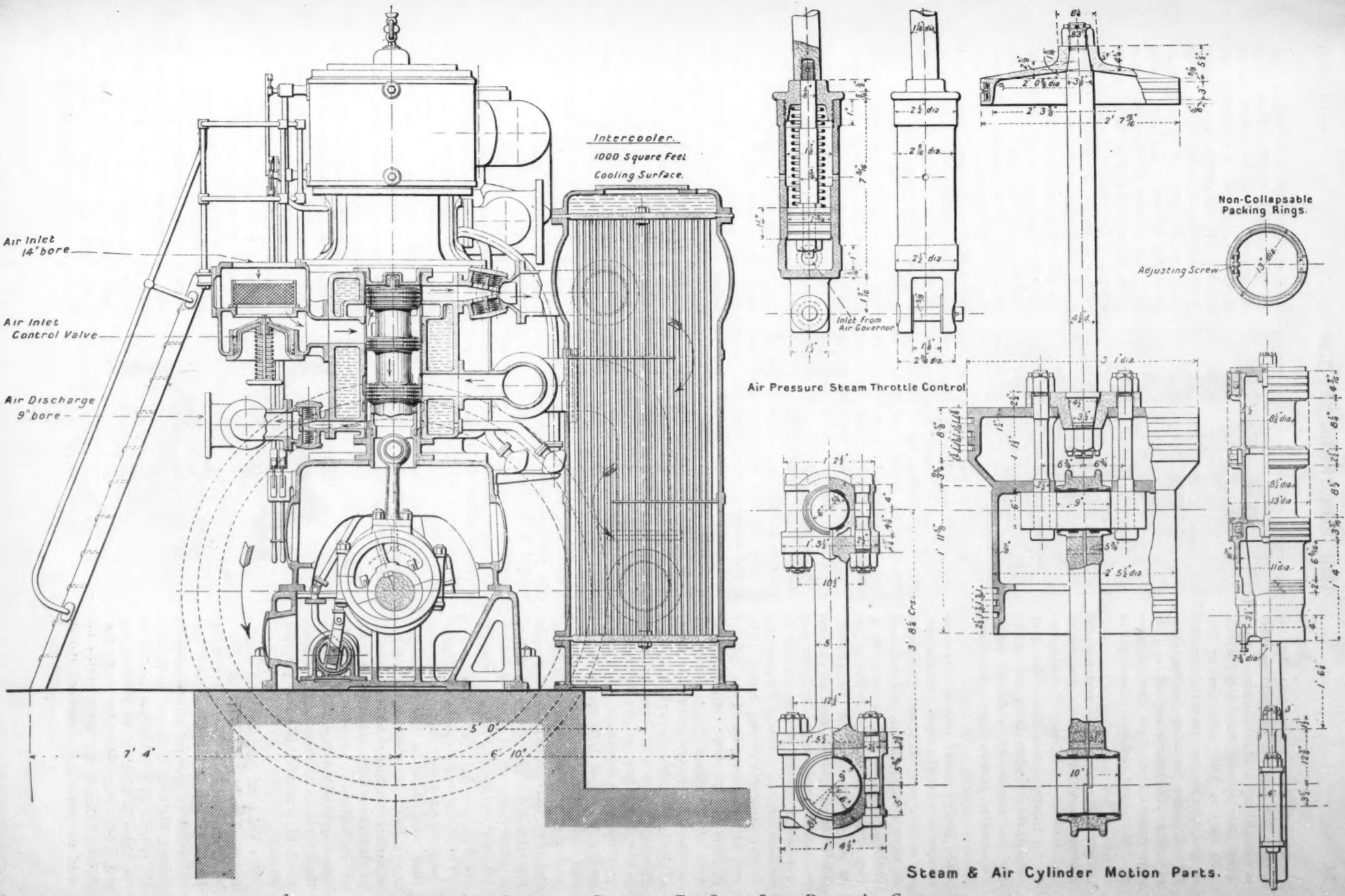


FIG. 3—CROSS-SECTION AND DETAILS OF TWO-STAGE, STEAM-DRIVEN AIR COMPRESSOR.

factory that has ever come under our notice. The machine was built by Alley & Maclellan, Ltd., Glasgow, North Britain, for Johannesburg, South Africa.

Its duty is 5,000 cubic feet of free air per minute net capacity, corrected for all losses, including heating, compressed to 100 pounds per square inch. A perspective view of the plant is shown in Fig. 1, and sectional drawings in Figs. 2 and 3.

There are three cranks arranged 120 degrees apart, over which are placed the trunk air cylinders. The compression is effected in two stages, the upper end of the cylinders being the intake. The final compression is carried out in the annulus formed under the trunk piston.

The general construction of the compressor is well seen in the illustrations. The motive power is obtained by means of three steam cylinders, one high and two low, 25 inches and 32 inches diameter respectively, each of which is arranged tandem over an air cylinder. The three air cylinders have all of them the same dimensions. In the larger part they are 37 inches in diameter and in the smaller 29½ inches. The diameter of the piston-rod is 4¼ inches. The area of the larger part of the cylinder is therefore—allowing for the piston-rod—1,061.014 square inches, and of the annulus 391.71 square inches. The stroke of both steam and air cylinders is 16 inches. The air, after being compressed in the larger part of the cylinder, is delivered to an intercooler which has a cooling surface of 1,000 square feet before being further compressed in the smaller part. The compressor cylinders and their valves, which are of the piston type, are all heavily water-jacketed. A perspective view of a differential piston and its piston valve is given in Fig. 4.

The compressor is designed to give the above-mentioned output when supplied with steam at 140 pounds per square inch, and when exhausting into a surface condenser which is capable of maintaining a vacuum within 4 inches of the barometric pressure. The designed speed of the engine is 187 revolutions per minute, which means a piston speed of practically 500 feet per minute.

The action of the compressor will be readily understood. During the down-stroke of the piston A—see Fig. 2—air from the atmosphere is admitted past the positively operated piston valve D, through the port H to the low-pressure air cylinder B. When the motion of the piston is about to be reversed, the piston valve closes the inlet to the low-pressure cylinder, and when further upward movement has compressed the air

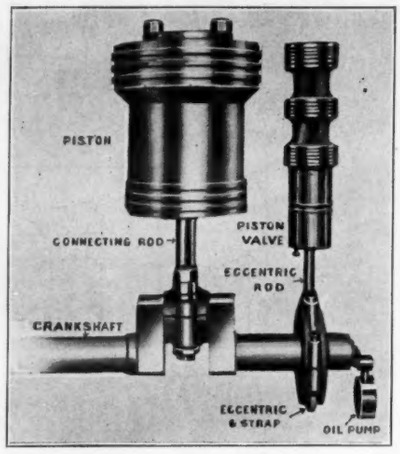


FIG. 4—DIFFERENTIAL PISTON AND PISTON VALVE.

the piston valve has moved downwards, permitting the discharge of air over its head and through the low-pressure discharge valve-box to the intercooler. While the piston has been moving upward, air is drawn from the intercooler past the piston valve into the annular high-pressure cylinder, and the next down-stroke further compresses the air in that cylinder until it is discharged at the working pressure past the piston valve and the discharge valve-box to the storage reservoir. The air is drawn in at the top of the machine, where it is most free from flying grit, and is further purified by passing it through a gauze strainer. The surface area of this strainer is large, and it can be drawn out and cleansed in a few moments.

The valve gear is simple and solid. The principal part is the piston valve, marked D in Fig. 2. This, in effect, is exactly the same as the piston valve of a steam engine, but it is timed somewhat differently. It regulates for both high and low-presure cylinders—(1) the commencement of admission, (2) the termination of admission, and (3) the cessation of the air discharge. The actual discharge of air from each cylinder is controlled by groups of poppet valves, which are made from special oil tempered steel. To follow the action, take first the low-pressure end. Imagine that the piston A has moved enough downward to allow the air in the clearance space to expand to atmospheric pressure. The piston valve D at that moment is far enough up to allow air to be drawn from the atmosphere past the edge of the piston valve marked *a* into the low-pressure cylinder B. At the bottom of the piston's stroke the cylinder is full of air, and the piston valve shuts the port H by its edge marked *a*. Shortly afterwards the piston, having moved upwards, compresses the air until finally, the piston valve having at the same time descended, allows the partially compressed air to escape above its edge *b* through a set of poppet valves, seen in the cross section in Fig. 3, to the intercooler. The functions of the high-pressure cylinder are controlled in the same way, excepting that the motion is opposite.

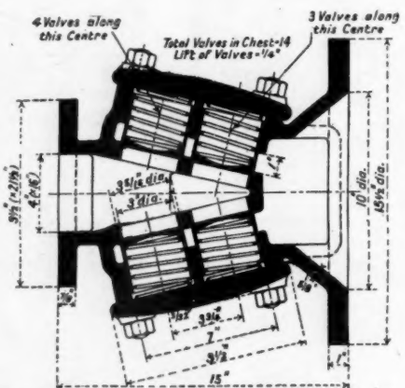


FIG. 5—LOW PRESSURE AIR DISCHARGE VALVE.

The piston valves have three other functions in addition to the foregoing. First they insure that the poppet valves are returned gently on to their seats. Such valves when placed, as is usual, direct on the cylinder, follow the receding piston above which they work on to their seats. In the design of Messrs. Alley & Maclellan the poppet valves follow the piston valve, not the main piston; and as the area of the piston valve is about one-eighth that of the piston, and as its stroke is about one-fourth, the rate at which the valves come on their seats is relatively as the product of these two, or 1/32 of the usual rate. Then, too, the blow the valves strike on their seats is as the square of the rate of closing, so that the valves under consideration strike their seats with 1/1,000 part of the impact which would result if they acted without the cushion of the piston valve. The result naturally is that there is considerably less noise and that the valves last a good deal longer; indeed, the makers claim that they are practically everlasting, and after continued running show no appreciable wear on their faces. The low-pressure discharge valve is shown in Fig. 5.

Secondly, the piston valves reduce the clearance losses to a minimum. The clearance volume is only about 4 per cent. Thirdly, as the makers point out, they introduce the air in thick streams, so that the friction of entry is reduced and the cylinders are fully filled at each stroke with cool air. The drawing of a large volume of air through too small ports will certainly develop heat.

After the first stage of compression is complete the air passes through the

intercooler, and is there cooled before being delivered to the discharging cylinder. The cold cooling water enters the intercooler at the bottom, flows as it is heated along the lower set of tubes to the other end, and then back along the upper set of tubes to the water outlet. The hot air enters at the top and is discharged when cooled at the bottom. The intercooler works on the counter-current principle, and the air impinges on and is split up by the tubes, so that the cooling surface is utilized to the fullest extent. The circulations of the air and the water are both in the natural directions, so that only heated water and cold air can escape. Details of the high-pressure discharge valve are given in Fig. 6.

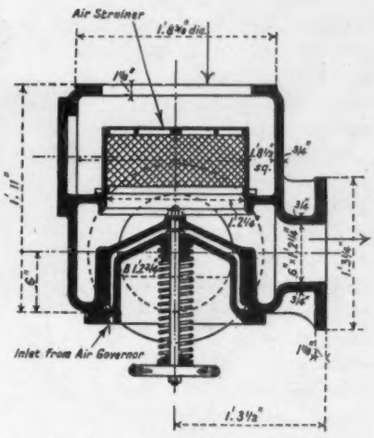


FIG. 7—AIR INLET CONTROL VALVE.

The governing of the compressor is carried out automatically. For this purpose an automatic slowing gear has been fitted, which reduces the speed of the plant when the pressure reaches a fixed limit. This is shown in Fig. 1 and in Fig. 3. An air throttling apparatus is also shown in Figs. 7 and 8. The reservoir pressure is conveyed through a small copper tube to below a spring loaded copper diaphragm shown on the left-hand side of the illustration—Fig. 5. When the pressure rises, say, 2 pounds above that fixed for the working pressure this diaphragm rises, and in doing so opens the small valve shown below it. The effect is to admit air under pressure to the bottom of the larger spring controlled valve shown in the air inlet. This valve is normally open, but when the reservoir pressure is admitted below it, it at once shuts so that no air can pass into the compressor. The main piston of this valve is a good fit in its cylinder, but is not provided with absolutely tight packing, so that when the governor valve closes through the fall of pressure and the governor ceases to pass air, the slight leakage past the piston allows the spring to act and the control valve opens promptly. A fall of pressure of from 2 pounds to 3 pounds starts the machine, so that it will deliver again at its full capacity.

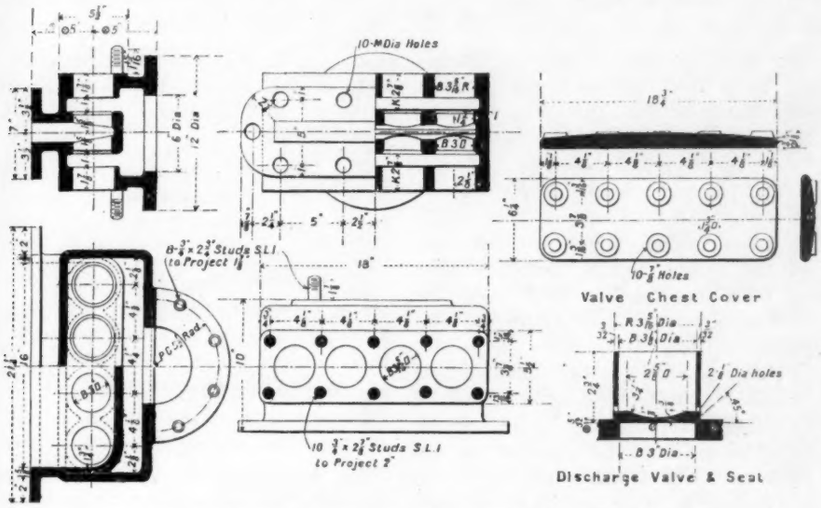


FIG. 6—HIGH PRESSURE AIR DISCHARGE VALVE CHEST.

The method of oiling is by forced lubrication on the well-known principle of the makers, with which our readers are familiar. Two valveless oil pumps are provided, and these are operated from the low-pressure steam valve eccentrics. They are disposed 120 degrees apart, so that there is a fairly uniform distribution of oil into the lubricating pipe system.

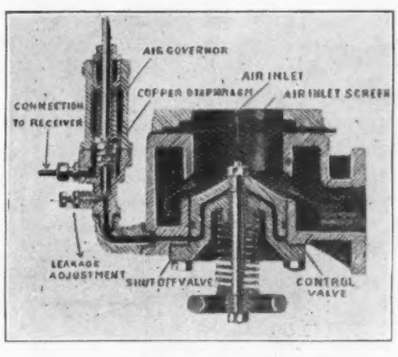


FIG. 8—AIR INLET CONTROL VALVE.

The plant is strong in design, and is intended for continuous running at full output. The crank shaft is 9 inches in diameter, and bearings 11 inches long are provided at both sides of each crank. The crank pins are 9 inches in diameter and 10 inches long, while the crosshead pins are 6 inches in diameter and 9 inches long. The crosshead bolts are carried through the piston and are secured to a steel flange on the piston-rod. This form of construction, it is pointed out by the makers, insures a sound mechanical attachment and the proper alignment of the piston rods. The steam cylinders are carried on trunks, the lower flanges of which are spread to the full diameter of the air cylinder covers. Metallic packing is fitted to all the piston and valve rods. The flywheel is 8 feet 6 inches in diameter and weighs 13,450 pounds. The net shipping weight of the compressor and gear was 135,000 pounds, and of the condensing plant 15,650 pounds, a total of 164,100 pounds.

Competitive Prize.—The Engineers' Society of Pennsylvania has an established fund to provide prizes for meritorious designs of engineering structures. At this time prizes are offered for the best design of ornamental poles for the support of lights and trolley wires. Plans, specifications and estimates of cost must be submitted. The competition is to close July 15, when the designs submitted will be opened by the board of award. For particular information, address Paul A. Cuenot, chairman, prize committee, Engineers' Society of Pennsylvania, Harrisburg, Pa.

The Marathon Paper Mills Co., of Wausau, Wis., has awarded a large number of equipment contracts for the new plant at Rothschild. The Wausau Iron Works will do all steel work; electric wiring and switchboards, Lounsburg Bros. & Co., Chicago; seven 84-inch wet machines, Beloit Iron Works, Beloit, Wis.; four 3-pocket, 27 x 54-inch international grinders, Friction Pulley & Machine Works, Sandy Hill, N. Y.; one barker, Green Bay Foundry & Machine Co.; screens, Glens Falls Machine Works, Glens Falls, N. Y.; 10 6-foot barkers, one double vertical splitter, two 88-inch four-knife chippers and one 7 x 27 feet chip screen, Valley Iron Works, Appleton, Wis.

OIL VS. GAS, COAL OR COKE FLAME FOR ANNEALING OR TEMPERING.

By G. P. Blackiston.

During recent years, when furnace construction has played such an important part in heat treatment of steel, little consideration has been given the fuel and its effect upon the product. As a result some very peculiar charges have been placed against the furnaces which should rightfully be attributed to the reaction of the fuel used for heating purposes.

The writer has had occasion to make some very interesting experiments along these lines, with the result that oil fuel was found to be far superior for annealing, tempering and case-hardening purposes, to gas (natural), coal or coke. The flame seems to contain less impurities or foreign elements having a tendency to injure, to a great degree, the surface of the steel which is heated. Such effects are, of course, generally visible to the naked eye, but become most pronounced under microscopic examination. The oil flame or heat appears to have a tendency to soak more uniformly and more rapidly into the bars, leaving it in what might properly be described as a more moist conditon than the other fuels. As a result, the oxidation is not nearly so pronounced as in the case of gas or coal.

An extensive and exhaustive series of tests having been made for the positive determination of which fuel secured the best results, Tate, Jones & Co., Inc., general offices, Pittsburg, Pa., have designed and built a furnace capable of producing these results in the maximum degree. The furnace is of iron construction with fire brick linings. The hearth or furnace proper is so designed as to permit the reception of either boxes or loose articles—the curvature or arch of the roof assuring uniformity of heat in either case.

A storage tank with a capacity of 26 to 32 gallons of fuel oil is connected to the furnace in a convenient place to one side, and a pressure blower (if regular shop blast is not utilized), is located on the floor on the opposite side. The oil is forced from the storage tank to the burner located on the opposite side of the furnace by means of air pressure. The burner, which is of special design, is so constructed that an absolutely perfect mixture is assured at all times, the atomizing of the air and oil forming a flame of regular and uniform character. Entering as it does at the center of one side and near the top of the furnace, the flame or heat is thrown down by the peculiar curvature of the roof, so as to secure a uniform temperature throughout the furnace. The vent, or escape, being located in the roof of the furnace in a corner located on the same side as the burner, the heat is given an opportunity to circulate entirely around the six walls of the furnace before making its escape. A suitable door is provided extending across the entire front, thus permitting the furnace to be used to its maximum capacity.

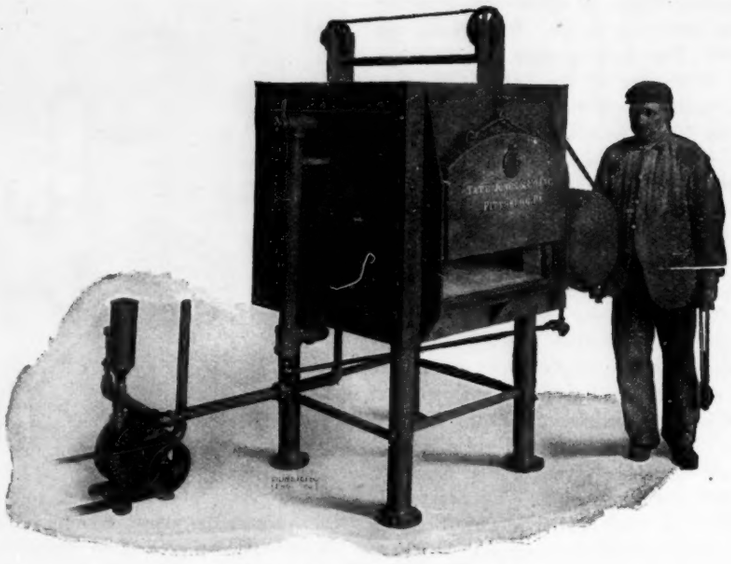


Fig. 1—Arrangement of Oil Furnace.

The hearth, roof and walls are all lined with the best refractory brick made especially for the work for which these furnaces are designed, and in the construction throughout durability and convenience have been kept in view.

The fuel oil storage tank can be filled as desired, the most popular method being a small hand centrifugal pump.

It is claimed that this design provides a furnace which not only possesses the advantages of the proper fuel, but one whose temperature may be regulated and maintained as desired.

The Erie Forge Co., Erie, Pa., began operating its open-hearth department June 12, when the first ingot was poured.

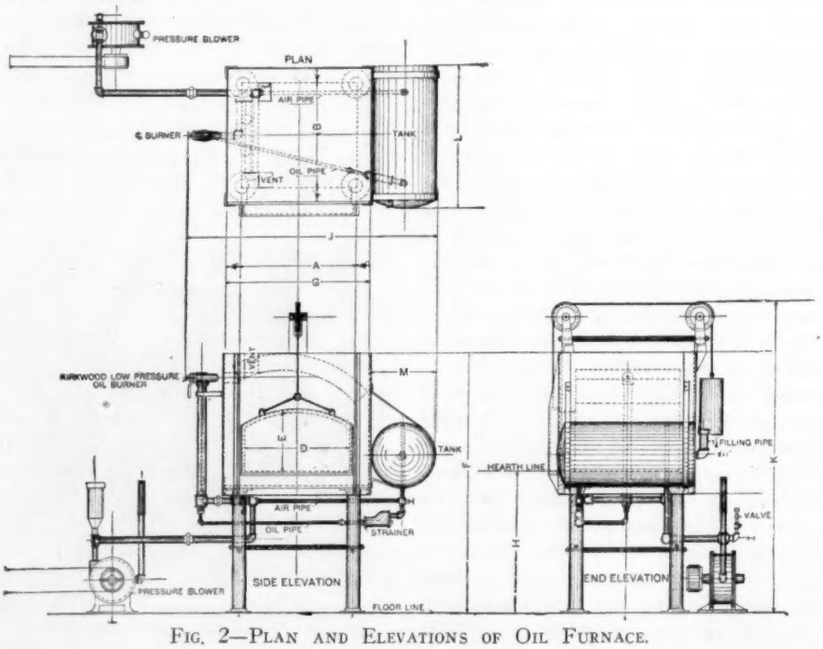


Fig. 2—Plan and Elevations of Oil Furnace.

THE APPLICATION OF THE LASH PROCESS TO THE ELECTRIC FURNACE.[1]

By Francis A. J. Fitzgerald.

In a paper read at the New York meeting of the American Electrochemical Society,[2] a description was given of certain experiments made at Niagara Falls on the manufacture of steel in the electric furnace using the Lash process. From various comments that have been made on the subject of the Lash process there is reason to believe that the subject was not presented with sufficient clearness, and consequently various misconceptions as to what the Lash process is and what its application might be have arisen. For this reason it seems desirable to present a more detailed analysis of the process that will bring out clearly the points of economy which the process is supposed to offer. In order to do this it is necessary to repeat things which have already been said, but as these can be expressed concisely it is convenient for the sake of clearness to allow the repetition rather than give references.

Mr. Horace W. Lash became interested several years ago in the problem of the direct production of steel from iron ore, and carried out many experiments in the investigation of this subject. The final outcome of this study was the development of the Lash process, which might be described as a compromise between certain methods of refining and the direct production of steel from the ore. It was found that when an intimate mixture of iron ore, carbon, fluxes and cast iron borings was heated, that reduction readily took place, and that by a suitable proportioning of the mixture the desired grade of steel could be obtained.

In one of the final experiments a series of mixtures was made up in which the percentage of cast iron borings varied from a large amount to nothing, and these mixtures were then heated in the same furnace under exactly the same conditions. From this experiment it was learned that the mixture containing no cast iron borings did not react in a satisfactory manner, and that the presence of a certain percentage of that material was necessary in order to produce steel in a commercial way. In other words, it was found that the desired grade of steel could be produced, and that the chemical efficiency of the process or the yield of metal was very high.

From these experiments and the like, the necessary data were obtained to undertake the work on a commercial scale, and since then hundreds of tons of steel have been made in the open hearth furnace using the Lash process, and this has shown: (1) that a superior quality of steel is obtained in this way: (2) that the cost of producing the steel is in general lower than when the regular methods are employed. As regards the latter point it should be noted that the calculations on which the assertion is based are not mere estimations from certain assumptions, but are the result of the actual costs involved in a series of runs in the open hearth furnace using the Lash process as compared with the cost of steel produced in the same plant using regular methods.

After the study of the working of the process in ordinary furnaces had been carried to a successful conclusion, FitzGerald and Bennie were engaged to make a study of the working of the process in the electric furnace, for in that apparatus certain advantages could be obtained which are not found in the open hearth furnace. In the electric furnace the atmosphere is neutral, while in the open-hearth furnace it is oxidizing, thus making more difficult the proper control of the carbon content of the steel produced when the charge is melted down. In working with the open hearth furnace it is necessary to use a certain amount of pig iron or scrap, or both, in addition to the Lash mixture, while in the electric furnace this should not be necessary, and since the cost of a unit of iron in the mixture is much less than in the form of pig iron or scrap, an economy would be introduced which would offset, at least to a certain extent, the high cost of generating heat electrically. Finally, it seemed possible that the application of the process to the electric furnace, which has already demonstrated its usefulness in the manufacture of steel under certain conditions, would, by the introduction of economies, extend the field in which it could be used.

The electric furnace experiments were carried out on a small scale at first, and it was found that the yield of metal amounted to over 98 per cent, and that the carbon content could be most accurately predicted if the original composition of the mixture was known. Following these experiments on a small scale it was planned to work in a large electric furnace of the Heroult type, and with this apparatus about 50 tons of steel were produced. The steel was of various grades, from high carbon tool steel to metal running below 0.10 per cent in carbon. The electric furnace experiments have been described in more detail elsewhere,[3] and, therefore, we here simply mention the conclusion that steel may be produced in the electric furnace using the Lash process with an expenditure of approximately 1.63 kilowatt hours, per kilogram, or 0.25 horsepower year per metric ton.

In order to obtain a general view of the Lash process and permit of making comparisons, a series of tables are presented. These are calculated for the production of 100 tons of steel ingots by various processes. It must be noted that the figures given for the Lash process are based on actual practice, and are not mere assumptions. In each case it is assumed that the loss of metals amounts to approximately 5 per cent. The mixture used in the Lash process contains cast iron borings, or granulated pig iron, ore, coke and lime. In some of the work other materials, such as sawdust and tar, have been added; the former to make the mixture porous and permit of the ready escape of the gases formed in the process of reduction; the latter to act as a binder when it was desired to briquette the mixture. For purposes of comparison, the sawdust and tar may be omitted, as they are not necessary constituents, and so far as the lime is concerned it may also be disregarded, since in any process there will not be much difference in the amount of that material used. The important constituents of the mixture then are pig iron, ore and coke. All of these must be finely divided, and since cast iron borings can only be obtained in limited quantities, it may be well to mention that there would be no difficulty in obtaining granulated or shotted pig iron for the mixture. Experiments were undertaken to find out if this material could be readily obtained, and as a result it was found that the pig iron manufacturers were ready to supply it at the same price as the pig iron in the ordinary form.

In the tables it is assumed that pig iron contains 95 per cent metallic iron, scrap iron 100 per cent, and ore 65 per cent.

TABLE I.

LASH MIXTURE.

Raw Materials. Granulated.	Per cent.	Per cent iron in mixture.
Pig iron	23	21.9
Ore	60	39.0
Coke	11	....
Lime	6	....
Total	100	60.9

[1] A paper presented at the Niagara Falls meeting of the Electrochemical Society, May 6, 1909.

[2] "Transactions of the American Electrochemical Society," 14 (1908), 239-249.

[3] Ibid.

TABLE II.

PRODUCTION OF 100 TONS OF STEEL INGOTS IN THE OPEN-HEARTH FURNACE, USING PIG IRON AND SCRAP.

Raw Materials.	Tons.	Tons of iron.
Pig iron	50	47.5
Scrap	57	57.0
Ore	2	1.2
Total	109	105.7

TABLE III.

PRODUCTION OF 100 TONS OF STEEL INGOTS IN THE OPEN-HEARTH FURNACE, USING PIG IRON AND ORE.

Raw Materials.	Tons.	Tons of iron.
Pig iron	94	89.3
Ore	26	16.4
Total	120	105.7

In using the Lash process for the manufacture of steel in the open hearth furnace, a certain amount of pig iron or scrap must be used in addition to the Lash mixture. A typical charge for the production of 100 tons of steel ingots is as follows:

Lash mixture	122 tons.
Pig iron	32 tons.
Ore	2 tons.

On this assumption we have:

TABLE IV.

PRODUCTION OF 100 TONS OF STEEL INGOTS IN THE OPEN-HEARTH FURNACE, USING THE LASH PROCESS.

Raw Materials.	Tons.	Tons of iron.
Pig iron	60.1	57.1
Ore	75.2	48.8
Coke	13.4	....
Total	148.7	105.9

Using the Lash process in the electric furnace, it is not necessary to have a quantity of pig iron or scrap in addition to the mixture, so that for the production of 100 tons of steel ingots the charge would be as follows:

Lash mixture	172 tons.
Ore	2 tons.

Then we would have:

TABLE V.

PRODUCTION OF 100 TONS OF STEEL INGOTS IN THE ELECTRIC FURNACE, USING THE LASH PROCESS.

Raw Materials.	Tons.	Tons of iron.
Pig iron	40.7	38.7
Ore	103	66.9
Coke	19.5	....
Total	163.2	105.6

For the purpose of comparison the figures given above are grouped in the following table:

TABLE VI.

COMPARISON OF DIFFERENT METHODS OF PRODUCING 100 TONS OF STEEL INGOTS.

Raw Materials.	O. H. furnace scrap and pig. Tons.	O. H. furnace pig and ore. Tons.	O. H. furnace Lash process. Tons.	Electric furnace Lash process. Tons.
Pig iron	50	94	60.1	40.7
Scrap	57	..	....	....
Ore	2	26	75.2	103
Coke	..	..	13.4	19.5

So far as the open hearth furnace is concerned it appears evident that nothing more can be expected in the application of the Lash process than is shown above. It may be that some further reduction in the amount of pig iron used may be reached. The experiments with the electric furnace, however, have not been carried so far, and it is therefore probable that better results can be obtained than those which have been indicated. It may be possible, for example, to reduce the percentage of granulated pig iron used in the mixture. This possibility suggests the interesting question: Why use pig iron at all? Is it not possible in the electric furnace to use a charge consisting of ore, carbon and fluxes?

The excellent and well known work of Stassano has answered the latter question affirmatively, and he has shown that charging his furnace with a mixture of ore, carbon and fluxes, paying careful attention to the proportions, it was possible to produce steel of the desired grade. Seeking an answer to the first question, it must be remembered that Lash's experiments showed that when various mixtures containing different percentages of cast iron borings were used, it was found that the mixture which contained very little or no metallic iron failed to react in a satisfactory manner, and it was this result which in great part led to the development of the process in its present form.

If mercury and iodine are rubbed together in a mortar there is no appreciable reaction, but if the mixture is moistened with a little alcohol the mercury and iodine combine to form an iodide. The analogy is very far from being exact, nevertheless it may be used in considering the Lash experiments. Apparently the presence of the pig iron intimately associated with the mixture of ore and carbon assists in a marked way the reaction between these constituents of the charge.

Experiments have been made in the electric furnce by Mr. Robert Turnbull for the purpose of comparing the reaction of the Lash mixture and a charge containing no granulated pig iron. The results obtained confirmed the belief in the importance of the pig iron constituent, for not only was the power consumption excessive where no metallic iron was used, but the mixture boiled or frothed in a very troublesome manner instead of melting down in a relatively quiet way, which is characteristic of the Lash mixture. Moreover, where no pig iron was used the consumption of electrodes, in a furnace where the heating is done by drawing arcs between the charge and the electrodes, is very much greater than when the Lash process is employed.

Therefore, in answer to the question as to why pig iron should be used at all, it may be replied that its presence reduces the amount of energy required to produce a unit weight of metal from the ore, and that, by making the reaction proceed more quietly and rapidly, diminishes other expenses connected with the working of the electric steel furnace.

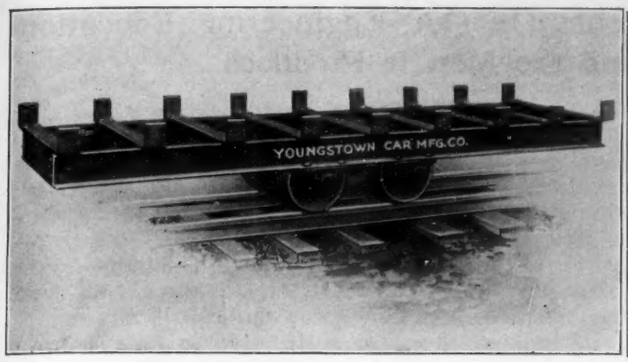
THE COMMERCIAL ASPECT OF THE ELECTRIC FURNACE.

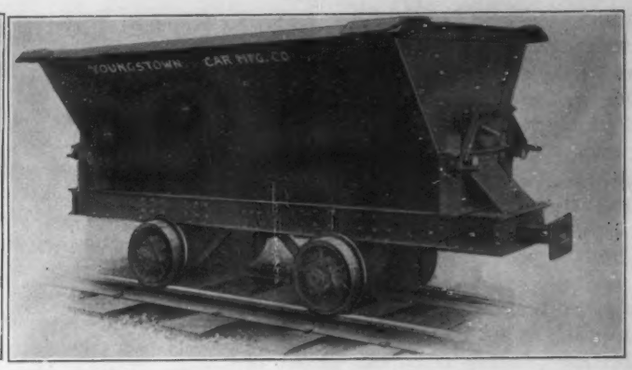
One thing should not be overlooked in estimating the commercial prospects of the electric-steel furnace. It is the fact that its introduction does not mean the scrapping of existing metallurgical plants. The electric furnace is not a competitor, but a supplement to existing plants. We can speak even more strongly. The electric furnace not only does not mean scrapping of old plant, but it seems destined to prevent the scrapping of old plant, as it promises to give a new lease of life to the converter. The general tendency of recent years has been away from converter steel toward open-hearth steel, and pessimists have already seen the beginning of the end of the converter. It is at this point that the electric process steps in, since the combination of the converter with the electric furnace should satisfy all reasonable requirements. This fact and the undeniable tendency of the times to demand better steel for general purposes, are considerations of utmost importance, if it is questioned whether the cost of electric-steel refining is worth the price.—*Electro-Chemical and Metallurgical Industry.*

BOOK REVIEWS.

The Gas Engine. By Frederick Remsen Hutton, E.M., Ph.D., Sc.D., New York: John Wiley & Sons. London: Chapman & Hall, Ltd. 6 x 9 inches. 562 pages. Illustrated. Supplied by THE IRON TRADE REVIEW for $5.00.

Professor Hutton's book on gas engines is too well known to require any extended introduction to this, the third edition of it. It is work which presents not only the theory of the gas engine, but the practice as exemplified by the designs of many builders. The present edition has had added to it such material, as, in the opinion of the author, will render it of greater service to its users. Among these may be mentioned a reference table of gaseous fuels which shows the chemical composition and calorific value of 78 different gases. The author has also revised and extended somewhat his treatment of the subjects of mean effective pressure, efficiency and guarantees. The discussions on the gas producer and on the alcohols as fuels have also been considerably enlarged.





INDUSTRIAL HAULAGE.

By Donald Parson.*

The question of industrial haulage is so intimately connected with the problem of economic procession through the various stages of manufacture, that no apology is needed, nor shall any be offered, for this short article.

There are in the main four available methods of propulsion—hand, animal, cable (including rope haulage, both tail and continuous), and locomotive (steam, gasoline and electric). The chief determining factor in the choice of these methods is "What is the material to be conveyed?" The core-oven truck or the small platform car used to carry stiff mud to the drying kilns of a brick plant are, to mention two instances, from their light weight and short travel, used to best advantage as push cars. Conversely, the heavily loaded ingot buggies of the steel plant are from the nature of their service precluded from hand haulage and are best managed with locomotive traction. Local conditions which are purely occasional, such as length of haul or the size of the enterprise, will enter into the choice, but in the majority of cases, the material will determine the means. In general, it is safe to say that the trend of practice is toward the more expensive installation in cases where the scale of operations will justify the outlay. Thus coal mining has progressed from the push car to the mule train; from the mule train to rope haulage, and from rope haulage to the electric locomotive. In the same way, the weight of rail used has increased from the very light sections to 40 pounds, and in some cases to 60-pound sections. Similarly, the old style of cheaply constructed wooden pit wagon is being superseded by the all-steel mine car, the company with which the writer is connected having furnished 400 of these to a single operator. It seems to be established that such improvements, while exceeding in initial cost the cheaper equipment, will justify themselves in a consideration of the ultimate cost per ton-mile.

Cable haulage can sometimes be used profitably, and though the first cost is considerable, the elimination of labor wrought by the skillful layout of an automatic cable railway will in the end often result in a final real economy instead of an apparent loss. Such installations are quite common for coaling stations where the practice is briefly as follows:

The coal may be unloaded from barges with a grab bucket, dumping either immediately or through a hopper into the cable car. This car runs onto an elevated trestle, is automatically "tripped" by a knockout arrangement, and empties its contents into the storage pockets. The United States government has been quick to see the advantage of such an equipment, and now coals most of its warships in such a manner. The cars used vary from about 80 to 160 cubic feet, or from 2 to 4 tons of coal.

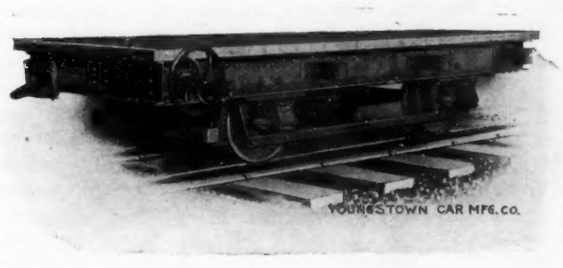
But with particular attention to iron and steel mills: here the weight of rail used of course depends on the weight to be transported. For ordinary uses it may be assumed that the normal carrying capacity is as follows for a four-wheel car and using ties spaced 3 feet between centers:

Eight-pound rail, 2—3 tons; 12-pound rail, 3—4 tons; 16-pound rail, 4—5 tons; 20-pound rail, 5—8 tons.

The heavier sections from 25 pounds up are generally assumed to carry, under proper conditions and with cross ties properly spaced, one ton of 2,240 pounds for each 10 pounds of rail weight per yard on each wheel. Thus if a car itself weighs 10 tons, has eight wheels and carries a load of 20 tons, the weight to be carried on the rail is 30 tons on eight wheels, or nearly four tons on each wheel. In this case the rail weighing at least 40 pounds per yard should be used.

There has been a sporadic attempt among steel mills to adopt a standard track gage of 36 inches. The advantages of such a practice would be several for the car builder; but for the steel mill inconsiderable, as the absence of any necessity for interchange of equipment between mills makes standardization necessary. Indeed, the track gage will be found to vary from the extremes of 18 inches to 4 feet 8½ inches. In favor of the smaller gage may be cited lower cost of roadbed, smaller space required, and an adaptability to sharper curves. Greater stability in operation and better service under high speeds recommend the broader gages. Thus the ordinary manufacturing plant, transporting light loads at low speed, will adopt the smaller gage; ore mines are almost invariably supplied with 18-inch or 20-inch track because of limitations of space. Larger operations may find

*The Youngstown Car Mfg. Co.



that a gage of 3 feet or 3 feet 6 inches admits of all the speed and sharpness of curves required, while still economizing in space over a standard gage track.

When we consider the various types of cars, we find that these are well nigh legion, the company to which the writer belongs having several thousand different styles. Of the more usual types there are, of course, the flat car and the various dump cars—side, end, bottom and all-around, the name alone being a sufficient description of the design. Of special cars for iron and steel mills, the variety is much greater. Cuts illustrating some of these cars accompany this article.

A few words of practical advice in inquiring for such equipment will not be amiss. In the first place, correspondence and delay will be minimized if the following information is supplied with the letter of inquiry:

Gage of track (inside distance between rail heads).

Weight of rail on which cars run.

Radius and length of sharpest curves.

General style of car desired.

Material to be handled, and its weight per cubic foot.

Capacity of car in tons or cubic feet.

Any limitation as to height, length or width.

Style of coupling and drawbar.

Distance from top of rail to center of drawbar.

Are cars to be operated by hand, cable, animal, steam or electricity?

Are cars to be used singly or in trains?

If in trains, how many cars to a train?

Diameter of wheels and axles; if new cars are to be used with old ones.

Style of axle boxes; whether inside or outside.

Whether with or without springs.

Kind of bearings desired; whether roller, brass, babbitted or plain.

In conclusion, it should be remembered that cars for iron and steel mills should be more than usually strong to withstand the use and abuse to which they are subject. It is the practice among the best industrial car builders to design extra heavily for the steel mill service. It is therefore only fair to them that purchasers of such equipment should note carefully the price per pound offered by the various bidders, or, better yet, specify the weight to which the desired car must come. Some such protection alike to buyer and seller will go far toward the elimination of the cheaply made light weight car.

Some Comments On Our Engineering Education and the Men It Produces*

By W. D. Taylor.†

During the five years spent in the university (of Wisconsin) and ending three years ago I listened to a number of engineering lectures arranged for by the university by a number of eminent engineers and managers of great industrial corporations. Some of these lectures were to me very interesting but many of them were quite the contrary. Those that did not very much interest me were generally made by some expert in some particular kind of engineering work who generally knew quite well how to do his engineering work but not so well how to interest a body of students.

There were many of these lectures that I was sorry that I attended, many of them being, for the most part, bare recitals of the outlines of machines that had been used to effect this or that end, or lectures in which the author made a laborious undertaking of the description of the minutest details of the methods by which some great work had been accomplished. There was one thing about the attention that the students gave these lectures that was quite remarkable and that was that where a man discussed a real live question, such as how to get a water-supply out of one valley through a chain of mountains to a city in an adjacent valley, the students always sat up and gave alert attention.

But whenever the same lecturer began to use his lantern slides to show how every little detail of a piece of work was carried out, interest immediately lagged and watches were consulted to see how much was left of the hour. I often noticed the same phenomenon in teaching my own classes until I got experience enough to at least try to omit details and methods as far as possible and to confine my instruction to principles and to a discussion of the broader questions connected with each subject.

Limiting Endeavor.

Perhaps you will say that as an engineering instructor I ought to have taken an active interest in all these things and perhaps you are right. But I want to say that I have found that I can't do it all. I have found that I am a man of very ordinary capacity, certainly so far as the whole broad field of knowledge is concerned, even of engineering knowledge. So I have learned to content myself with making a very modest endeavor to keep abreast with one very narrow field of engineering. But let me do my very best and still I will come very far short of perfection in learning even to properly construct and maintain a railroad. I know that I can't become an expert in the other fellow's line and I am really afraid to try. I fear that every time I reach out and grasp a great big idea that belongs in the other fellow's field that, my own head being of such limited capacity, something else equally as valuable to me in my own line of work will run over and spill out of the old vessel.

So, after I have spent such a part of each day as I can in making such headway as I may in my own line of work, I do not wish oftentimes to invade the domain of other engineers. I would rather walk into that wider domain that belongs to the brotherhood of all mankind. I would rather use that time in reading some of the good things stored up by generations of eminent scholars, in wandering in imagination through the interesting Scottish highlands with the great Sir Walter, in watching Miss Maude Adams in Peter Pan, or some such play, or in simply playing ball at home with my little boys. And I know that these things do me far more good.

Morality Not Discussed.

But before I leave the subject of these engineering lectures I want to tell you of an objection to every one of them, and yet many of these lectures were given by men who command our sincerest regard. But in all these lectures that I heard there was not, if I remember correctly, a single discussion of a moral question. The ideas dominant in every one of them were the Thomas Gradgrind facts as to how the work was done, the results achieved and how much money was gained or saved thereby. Seemingly there was to be no distinction in the future lives of the students, as conceived by these lecturers, between right and wrong. The strenuous life was urged for all it was worth, but no hint was made to these young men at this, the character forming stage of their existence, of the world's need of their living clean, upright lives filled with beauty, simplicity, repose, and

*Abstract of a lecture before the Engineering Club of the University of Illinois, Feb. 25, 1909, repeated by request before the senior classes in engineering at the University of Wisconsin, March 29, 1909. A more extended report of the lecture appeared in the *Wisconsin Engineer* for April, 1909, and will also be published by the University of Illinois.

†Chief Engineer, Chicago & Alton Railroad Co., Chicago, Ill.

neighborly kindness. Perhaps it was thought that these things were too obvious to mention. But it is in this especial matter that the addresses to students of public men differ from those that we used to hear twenty-five and thirty years ago.

And now let me ask the teachers present if the objections I have pointed out against these engineering lectures cannot with some justice be made to much of the whole training of our engineer students. In our eagerness to fill their heads with a smattering of knowledge of all forms of engineering, or at least of as many as we can possibly crowd into our curricula,—in our eagerness to make of them good craftsmen, playwrights, draftsmen, mechanics, and engineers, are we not forgetting to cultivate that side of their lives which must be developed if they are to become men—real *vires* not mere *homines?* Do we not assume too much in supposing that by directing our attention partly perhaps to their manual dexterity but principally to the growth of their minds that their moral and spiritual welfare will take care of itself?

Now I trust that you will not take me for an old croaker dissatisfied with all of the existing state of affairs. And I don't want you to believe that I have come up here with a bad taste in my mouth, nor that I am suffering from either melancholia or hysteria. On the contrary, I have abundant faith in American youth and in our country's future. And I have really little fault to find with the technic itself of modern engineering training, except perhaps, that we try to use too much of it.

Going Too Fast.

In our modern training for our engineers, as in our modern life, I fear we are going too fast. And in our haste to discard the older forms of training we have shelved, I fear, much that the lives of centuries of distinguished scholars have shown to be of the utmost value. I mean the development of the moral or higher and nobler side of the lives of our students.

Perhaps it is a subject which should not be discussed before such an audience as this, but I feel that I must say that I believe there is in our colleges and universities a great deal of inefficient teaching. We make a teacher's promotion dependent upon his success in research work. And it is beyond dispute that the qualities of mind which befit a man to do research work generally unfit him to do efficient work as a teacher. There is room for a long discussion here, but I will cut it short and only say that there is not a nobler work in this world than that of devoting one's self to the profession of teaching, pure and simple, that of leading out, expanding, and helping to grow, the bodies and minds of the young men of the land, the profession of man building. And it is a pity that we cannot have in our colleges a teacher's standing and promotion determined by his success in doing the thing he is employed to do, and for which he is paid.

The student comes to an engineering college to acquire the forms of thought, of speech, of work, and of action that he is to use in his professional life. If we teach him our subjects about after the manner that a burglar would use in instructing an apprentice, we could not expect to add much to his stock of integrity and refinement. But we might add some other things not quite so desirable. If, on the other hand, we make our instruction savor of manliness, courtesy and uprightness, and we choose to bring into our lectures and recitation rooms occasional instances and examples calculated to exercise the students' sense of justice as well as his finer feelings, I have that faith in absorptive power of the American student to believe that he will seize and appropriate to his own use a goodly share of those desirable characteristics while they are passing his way. Every teacher who has brought himself close to the lives and aspirations of his students knows and feels this to be true.

Some Definite Charges.

And now I want to make some definite charges against the engineering graduate of today and to say wherein he impresses me as not being quite the equal of former college men in some of the characteristics of a true and noble man. Please note that though I say I make charges, I do not attempt to prove logically that those charges are correct.

I grant at once, of course, and I am proud of the fact, that the modern engineer graduate is far more helpful than that older man was in advancing the industrial progress of the world. One must be a fool to argue otherwise. But it is difficult to see why, in these modern days when everything else has improved so much, our students should advance in one direction and recede in another. If it be true that there is a recession in some ways, it must be the fault of the student's training and environment, for the American Caucassian youth is the same today that he has been for a hundred years. And if he is receding in this respect his teachers should shoulder the responsiblity, for, as of old, they can mould to honor or dishonor, even as the potter has power to fashion his clay. The great body of our young graduates is just what their teachers and their mothers have made them.

Let me give you an instance now of the power of the teacher in molding students' morals: I taught for a period of seven years ending in 1898 in the school on the banks of the Mississippi river in Louisiana that was founded before the Civil War with the man who afterwards became Gen. W. T. Sherman at its head. Gen. Sherman, as all of you know, was a West Pointer, and he made much of drilling his early students in the need of their observing the same code of honor that he himself had learned to observe at West Point. If you should go to a student in that school and ask him what is the sentiment among his companions on the subject of cribbing, he would stiffen his shoulders and haughtily reply, that any man who is allowed to attend the Louisiana State University must prove himself too much of a gentleman to cheat. And the boast is not a vain one. I taught there seven years and in that time we had one serious case of cribbing. In this case the faculty had no need to issue an edict of suspension. The students took care of that part of the case as soon as guilt was established.

Not a Sectional Question.

But now I can take you to some northern schools in this same country of ours, very much larger and of very much greater reputation, where if you seek out any thoughtful conscientious student and ask him the same question as to the sentiment of the same subject among his companions he will invariably tell you it is about as bad as it well could be. It is a fact that at some of these schools there is hardly a general examination ever held that a number of students are not punished in one way or another for cribbing.

And now how is the difference in the sentiment on this subject to be accounted for at these schools? Would you say that the southern youth is naturally more honorably inclined than his northern neighbor? I know from personal experience with the youth of both sections that this is not true. I can tell you of a school in the south similar to the one referred to on the banks of the Mississippi river where the student sentiment on this subject is fully as bad as at any northern school.

I tell you the difference is accounted for by the unanimous continuous assertive force of the teachers in the interest of common honesty in the one case, and by the lack of concerted action

and moral force on the part of the faculty in the other.

To me this is a painful subject, but I should like to ask this question before I leave it. If we permit our students to form the habit of cribbing and cheating their way through school, what guarantee have we that they will not persevere in the habit after they leave our care and go on cheating and swindling their way through the world? Are there degrees of culpability in the acts of cribbing, cheating, swindling and stealing? I have never been able to see such a distinction. And yet I don't wish to fight any duels for saying that I believe it is true that a man who cribs his way through school will, as a rule, steal his way through his business life if opportunity offers.

And now I make my first and most serious charge against the engineer graduate of today; owing to the fact that the development of his moral nature is somewhat neglected in present-day training, he is apt to be less entirely honest than were the graduates of former days.

Too Much Crowding.

I will follow the first charge immediately with the second, and will say that owing to the fact that we crowd our modern engineering courses so full the present-day engineer graduate is liable to be less thorough than the old-time graduate was. Twenty-five years ago, 15 or 16 hours of recitation per week was considered enough. Extraordinary students were sometimes permitted to take 18. Now from 20 to 21 are required and frequently extraordinarily bright students, or those who have conditions to make up, are permitted to take from 25 to 30.

In this connection let me tell you of an experience with modern men. A few years ago a couple of junior students were secured from the school that claims to be the foremost engineering school in the United States to work one summer on one of the western railroads. These young fellows were specially recommended by their teacher to do the work at which they were put. They worked for three days in a vain attempt to connect two tangents out on an open prairie by a simple three-degree curve. Instead of getting the work done they brought in a demonstration purporting to show that the tangents could not be so connected. The same two men ran a line of levels four miles long several times and never once came within 3 feet of the true result, nor did any two trials give results within 3 feet of each other. I should like to give you a lot of individual experiences I have had with new college men where their lack of thoroughness in the very things they were supposed to know best has dearly cost the railway companies employing them and me, and caused the young men to be set back instead of forward in their profession, but time forbids.

Graduate's Shortcomings.

My third and last charge is that the present-day graduate, having skimmed so hastily over so many subjects without thoroughly mastering any or all of them, and not having his sense of duty keenly developed, is in some degree wanting in real efficiency, in contentment, fortitude, loyalty, and true manliness.

Perhaps, as President Woodrow Wilson intimates, it is characteristic of American national life to be discontented with one's lot and to be continually striving for something higher and better. But the degree of unrest among the engineer graduates in the positions into which they fall sems to exceed even the national unrest.

It used to be supposed that if a man received a promotion in railway work once in every three or four years, he was doing well, but like the labor union men, if the wages of the average graduate is not increased in railway work three or four times a year he feels sure that the road he is working for doesn't appreciate his eminent services.

I made it a practice while at Madison to ask my boys to write back to me after they had been out of school a while to let me know how they fared. I got together one day 25 such letters that I had received in the previous two or three years and went through them with a special purpose in view. Out of the 25 there were just three that expressed any satisfaction whatever with the work they were doing. Now let me tell you that every single one of those fellows had better positions than could possibly have been hoped for at so early a date in their career if they had graduated 25 years ago.

Effect of Feminine Instruction.

I sometimes think that our high schools, which are so largely taught by women, and where the number of female students is generally about three to one, are more potent in robbing our young men of real manliness than any other cause. A graduate of an average high school is really a graduate of a female seminary. A recent critic says that the average high school male graduate has learned from his association at school about enough to become a milliner or a dressmaker and that is about all. Look up some of the recent writings and speeches of the leading psychologist in America, Dr. Stanley Hall, and you will be surprised to see what such an authority as he thinks is the effect on our young men of our women-taught high schools. Dr. Hall is quoted as saying that when a mother has brought her son to the age of 14, she ought to untie her apron strings from around him, hand him over to his father and say, "Here is our son, I have had the care of him now for 14 years and have made the best boy out of him that I could. Now it's up to you to take him and make him a man."

This world is full of noble women, and no man has a keener appreciation of womankind, nor a greater respect for a true woman, than I, but I never saw one yet that could impart any manliness to a youth. A fellow must acquire manliness by brushing up hard against men.

Now when we get these women-taught high school men in college what should we do to rub out the femininity that they have absorbed? If the femininity is well grounded it sticks pretty close. Did you ever notice how diffidently a fellow acts and feels among men who has been so unfortunate as to be raised in a house full of nothing but women and girls? Such are the boys that stand on the side lines and bleachers and scream while the real men of the school are winning the football and baseball games. The poor creatures, they don't know how to yell.

Teach How to be Manly.

The college needs to teach such students how to be men as well as how to think. And no small part of its duty is to teach them how to fight and how to stand up for one's own. And when I say they need to be taught to fight and to stand up for their own, I, of course, don't mean that they should do this in any brutal or unmanly way. But it is too often the case that young men are discredited because they do not know how to assert themselves in a firm and dignified way that commands attention.

I like authority and I like discipline, and the good old hickory switch for bad boys and something very like unto it for obstreperous young men. There are a few real men developed in this world who have not been well exercised by both—by discipline and authority.

I have long ago gotten the idea out of my head as a teacher that the way to become popular with students was to make things easy for them; in other words, to let them have their own way. The way to win a young man's lasting affection and gratitude is to lead him,

or drive him if need be, to develop a power or capacity that he did not know was in him; or, in other words, to bring him to achieve.

Causes of Failure.

I could give you many an instance where young men have failed to accomplish the results expected of them for lack of the qualities named in my third charge above, and yet young graduate engineers who fail as I have indicated often wonder why, in railroad work, brakemen, telegraph operators, section foremen, and station agents, men oftentimes who have not enough education to solve a problem in the rule of three, are promoted ahead of them. The reason is clear to the railroad manager. He knows that while the college man was attending the woman-taught high school and going to college where he sat up late at night and ruined his health by eating indigestible suppers, and where he listened to easy lectures that appealed to him intellectually only in a dim and distant way, the brakeman and the telegraph operator had been learning by getting down close to sweating humanity the lesson of how to get there. And now when the railroad needed men to get things done, it wanted men who had brushed up hard against other men until they knew how to act like men.

I was talking one day, a year or two ago, to a level-headed, thoughtful, public-spirited and charitable business man who has been connected with the administration of the financial affairs of one of the large schools of the country for a great many years, and I mentioned some of the ideas that I have just related and asked him to what he ascribed these objectionable tendencies in so many of our young men.

He said that he had noticed the same shortcomings in the young men with whom he came in contact and that he believed that there was something almost radically wrong with any system of education that did not imbue the graduates of the schools with a higher sense of duty and a greater love of work for its own sake. In effect what he said was:

Spirit of Teachers.

I believe that the whole trouble is accounted for by the spirit of the teachers in our schools. The students are taught that the chief end of their education is, not to learn to enjoy life and to be useful citizens, but that they must expect to get right up to the top at once in whatever calling they enter; nothing else is worth while. These teachers in industrial and engineering schools study one subject until their minds become warped and they come to think that nothing else besides their own little subject counts. Further, they study the one subject until they become proficient in it, and coming in contact for the most part only with students of immature minds, they unconsciously assume an air of superiority to the rest of mankind. The student unconsciously apes his teacher and after he has passed his examinations comes to believe he, too, has mastered the subjects in his course and become a superior being; he adopts the condescending tone of his teacher and falls heir to his teacher's sense of superiority.

When the student goes into business his employers and associates don't take kindly to the attitude the young man assumes. What they generally want is work and help instead of arrogance and advice. The busy world sits down on the graduate good and hard and the young man becomes despondent and moves away in search of some other position where those eminent abilities of his will be more appreciated.

Not Room for All at the Top.

And now, young gentlemen, I want to say that in these days there are too many engineering graduates for all of you to hope to stand at the tiptop of your profession. It is an old saying that there is room at the top, but as the industrial world is at present organized, the top men must have a good many strong men upholding the platform on which they stand. Take for example, the organization of your great railroad here, the Chicago & Northwestern. It has use for hundreds of young men as track supervisors, bridge supervisors, draftsmen, assistant engineers, signal engineers, clerks, train electricians, roundhouse foremen, road masters, yard masters, train masters, division superintendents, etc. In the next eight years, I doubt not it would be possible for everyone of you young men to get into the service of that great corporation in some such capacity as I have named, where you would have a chance to do some useful work and to earn a decent and honest living. But I wish to remind you of the fact that that road has only one president, one general manager, and one chief engineer. And while I do not wish to discourage you, I doubt very much if it will ever have an urgent need for any one of you in any one of these positions. Even if it does, it will be safe to say that it will be so far in the future that you can't safely count on it now. It will not be until the sap has been pretty well dried out of your youthful bodies, and your minds and bodies have been strengthened by having successfully withstood many a trial and many a hardship.

But I want to say that the great need of the Chicago & Northwestern R. R., and of the industrial world which it typifies, is one of men who will do their work well in ordinary fields. It is a need of a man in each position who can be depended upon, who does not feel the need of the applause of his fellowmen to make him do his best. It is a need of men who are not seeking the spectacular and the heroic, but who are willing to do the same thing over and over again every day of their lives, doing it too with the same thoroughness and conscientiousness that our mothers used when we were boys in regularly washing the dishes three times a day.

But men seldom work that way these days. No sooner does a man become familiar enough with his tasks to be able to do them thoroughly, than he is off again to find something different if not better. Sameness tires him. The modern young man must have his work program changed at least as often as the bill of the vaudeville show that he attends.

In these days we never teach our young men that there is for each man such a thing as finding his own level, and that when that level is found he will make the world better and himself far happier and more useful by adapting his life to it and quietly staying in it.

The Happy Life.

I have known several men in my life that had found their level and who consistently refused to be led out of it. And I wish I had time to relate to you the happiness that has come to some of them who declined "promotion" for the sake of duty or in order to live a quiet, orderly and useful life. There are many such men who fill up the measure of their existence fully as well as Mr. Roosevelt or Mr. Taft does his.

There are thousands of places in our great industrial country where young men as engineer graduates can easily secure useful work that will make you and the world better for doing it. And this work does not need always to be done at the top of the ladder. I sincerely believe that the greatest kindness I could possibly do to this fine body of young men would be to make each one of you feel that in an engineer's life there is something worth while besides what's at the top, that there are many things in this life better than money, and that for the present the chief concern of each one of you should be to make himself a whole man.

Milwaukee Engineers.—The Engineers' Society of Milwaukee held its annual outing June 19. Gary, Ind., site of the works of the United States Steel Corporation, was the objective point, and the party of more than 70 spent the day inspecting the plant. At the annual meeting recently, T. S. Watson was elected president; Thomas W. Capen, vice president; W. F. Martin, secretary; M. A. Beck, treasurer. Charles J. Poetsch, C. C. Sprade and Emil Vilter were elected directors for three years.

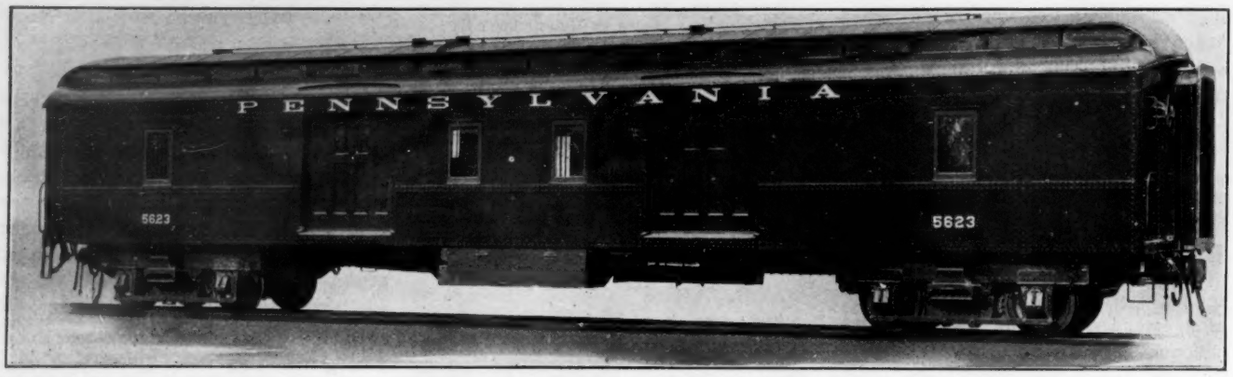


FIG. 1—PRESSED STEEL CAR CO.'S ALL-STEEL BAGGAGE CAR.

NEW TYPES OF STEEL COACH CONSTRUCTION.

While the all-steel coach has been a comparatively recent departure in car building development, rapid progress has been made along this line of railway construction until it has been made to apply to practically all classes of passenger train rolling stock. The experience derived by car manufacturers from steel freight car construction and the advanced use of metal in furniture, fittings, etc., have been favorable factors in promoting this development.

In addition to the regular all-steel passenger coaches manufactured for the Pennsylvania railroad, there has recently been built for this road at the works of the Pressed Steel Car Co., Pittsburg, a number of all-steel baggage cars and all-steel combination passenger and baggage cars which are shown in the accompanying illustrations. These cars have been constructed almost exclusively of steel, including the doors. The floors and headlinings are of fire-proof material and the very small percentage of inflammable material used is not a part of the structure but merely of the trimming. In the main structure of each combination coach there have been used 17,500 pounds of ¼ inch plates, 4,500 pounds of angles and 7,100 pounds of shapes and small plates. In addition, considerable steel material for interior finishing has been utilized. The flooring consists of monolith laid on corrugated sheets. A ¾ inch maple floor is placed upon the monolith in the baggage car and at the baggage end of the combination coach.

Six-wheel trucks were used on the combination cars and four-wheel trucks on the baggage coaches, both being equipped with 5 x 9 inch axles and 36 inch Carnegie-Schoen rolled steel wheels.

The general dimensions of the cars are as follows:

COMBINATION COACH.

Length over all	77 ft.	8¾ in.
Length over body corner posts	71 ft.	1⅞ in.
Length inside, passenger end	39 ft.	9⅛ in.
Length inside, baggage end	35 ft.	6 in.
Width over side sheets	9 ft.	9¾ in.
Height from rail to top of car	14 ft.	½ in.

BAGGAGE CAR.

Length over all	64 ft.	3¾ in.
Length over body corner posts	60 ft.	10⅜ in.
Length inside	60 ft.	3 in.
Width over side sheets	9 ft.	9¾ in.
Height from rail to top of car	14 ft.	½ in

Edward P. Allis Jr., son of the founder of the present Allis-Chalmers Co., of Milwaukee, Wis., has been elected a fellow of the North British Academy and also a member of the honorary council. Mr. Allis was previously honored by being presented a decoration by the French government.

Shedding Old Ideals.—The returns of selling prices and wages under the North of England conciliation board for March and April are much less encouraging than those of the Midland district already reported. The price has fallen from £6 11s 7d ($32.04) to £6 7s 9d ($31.11), and although wages remain the same a fall of only 3d more than that recorded would have sufficed to bring about a reduction. Since the end of 1907, wage reductions have aggregated 7½ per cent, and puddling prices are now 8s 6d ($2.04) per ton. This figure prevails in both districts, which the Midland workers consider a disadvantage as they are deprived of the 6d per ton considered to be due to them "in lieu of Northern extras." So little has been said of this lately that it would seem that the time-honored ideal is being abandoned.

Corporation Laws.—The Wingo bill, passed by the Arkansas legislature, has become a law, and hereafter all foreign corporations doing business in Arkansas must pay a fee of incorporation to the state on a basis of its authorized capital stock. This bill is simply an amendment to a similar bill passed in 1907, over which there had been formerly some question.

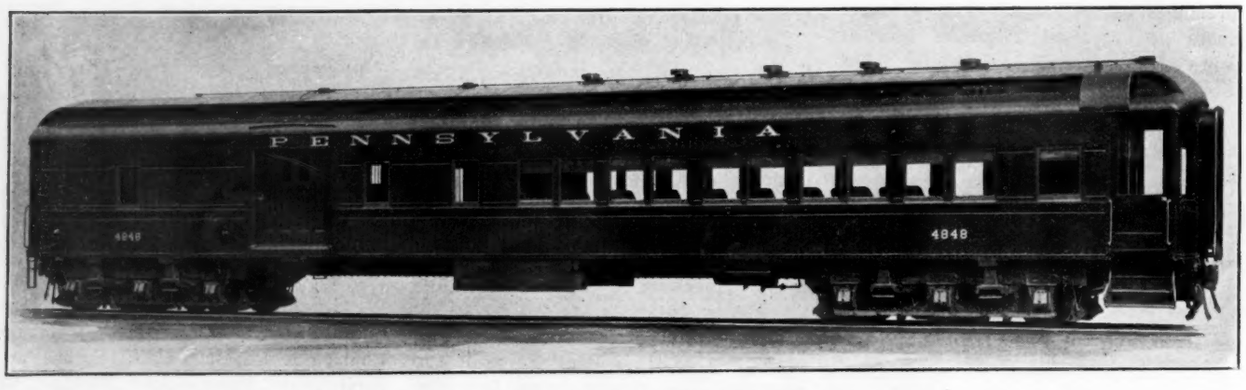


FIG. 2—PRESSED STEEL CAR CO.'S ALL-STEEL COMBINATION CAR.

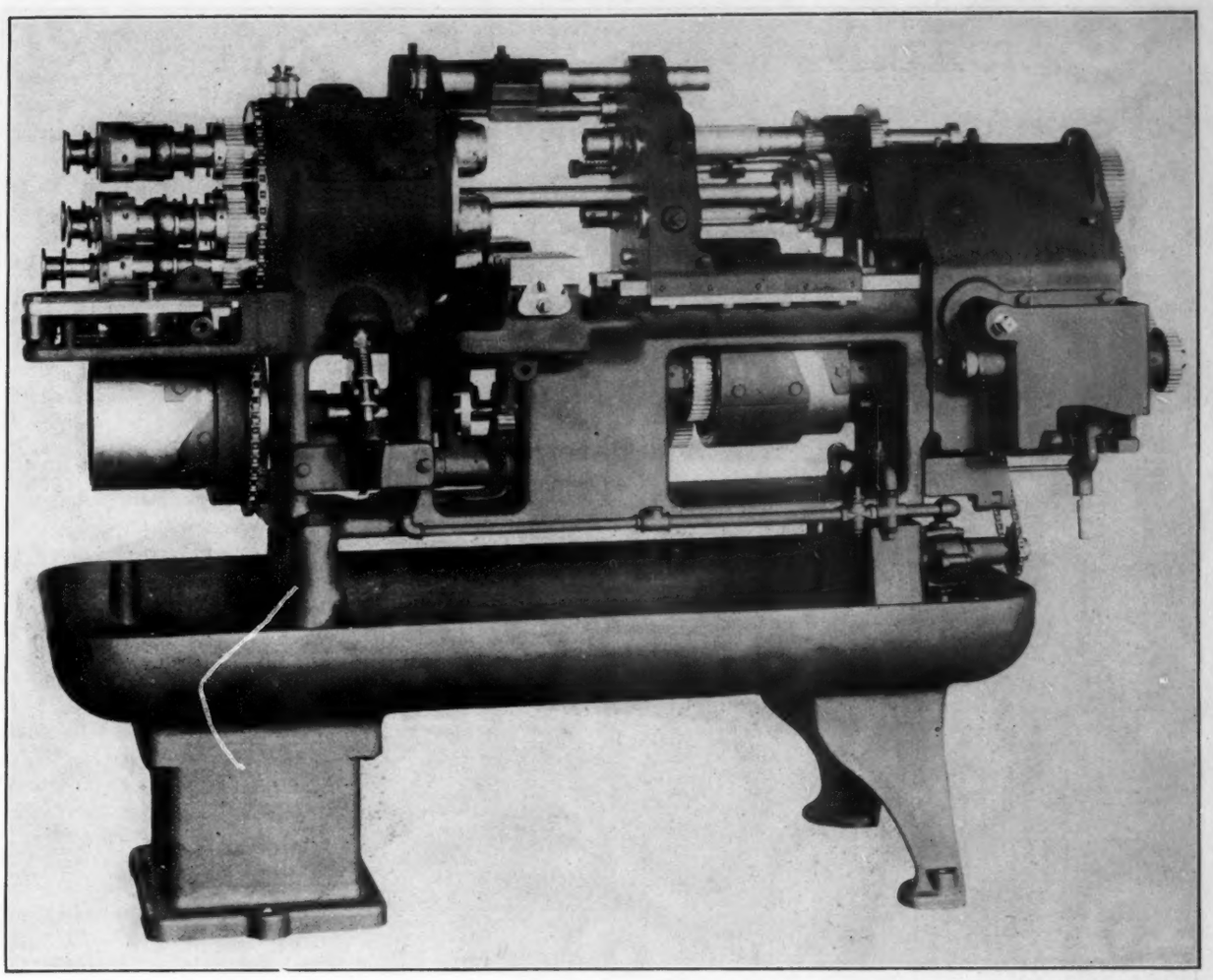


FIG. 1—FRONT SIDE.

THE PEERLESS AUTOMATIC MULTI-SPINDLE SCREW MACHINE.

In our issue of Dec. 3, 1908, there appeared a description of an automatic multi-spindle lathe or screw machine built by the Peerless Automatic Machine Co., of Cleveland.

The automatic screw machine here described is brought out by the same concern and is intended to take care of a more general run of work, and while in parts it follows closely the design of the first machine, a number of new features are incorporated.

Fig. 1 shows the front side and Fig. 2 the rear side, of the machine. The stock spindles as well as the automatic operating mechanism receive power from a single pulley running at high constant speed. This pulley is shown clearly at the left hand end of Fig. 2. Power is transmitted through reducing gearing to a constant speed shaft, in horizontal alignment with the pulley bearing shaft, and from there through change gears to the spindle driving shaft running through the center of the tool slide and the spindle head. A set of change gears afford means of obtaining the speed most suitable for the work to be done and the material and tools to be used.

The oil pump is driven by sprockets and chain from the pulley shaft. When the tools are active, that is, operating upon the material, the cam mechanism is driven from the spindle driving shaft through the quick change gear mechanism shown at the extreme right of Fig. 1. This mechanism gives five changes of feed for the tools and by interchanging two gears five more feeds are obtained. An extra set of two gears furnished give 10 more feeds in the same manner, thus making a total of 20 feeds ranging from 3/1,000 to 24/1,000 of an inch feed per spindle revolution. These feeds always bear a definite relation to the spindle speeds since the feed mechanism is intergeared with the spindle driving shaft. When the tools are inactive, that is, when no tools are operating upon the material, and while the spindle head is being indexed, the cam mechanism is driven direct from the constant speed shaft. The machine is thus always performing its idle movements at the same speed irrespective of the spindle speeds.

The cam mechanism can be instantly disengaged and locked into disengagement by pushing the knob, located below the feed box shown in Fig. 2, forward, during either the active or idle movements of the machine, which can then be hand-operated by means of a crank handle which can be attached to the squared end of the shaft projecting from the feed box shown in Fig. 1. To set the cam mechanism into action again, this knob is pulled outward, thus causing the proper feed to be started.

It is impossible to start the fast feed when the tools are in their operating position or to start the slow feed when the tools are in their idle position.

This machine is built with the knee type longitudinally moving tool slide

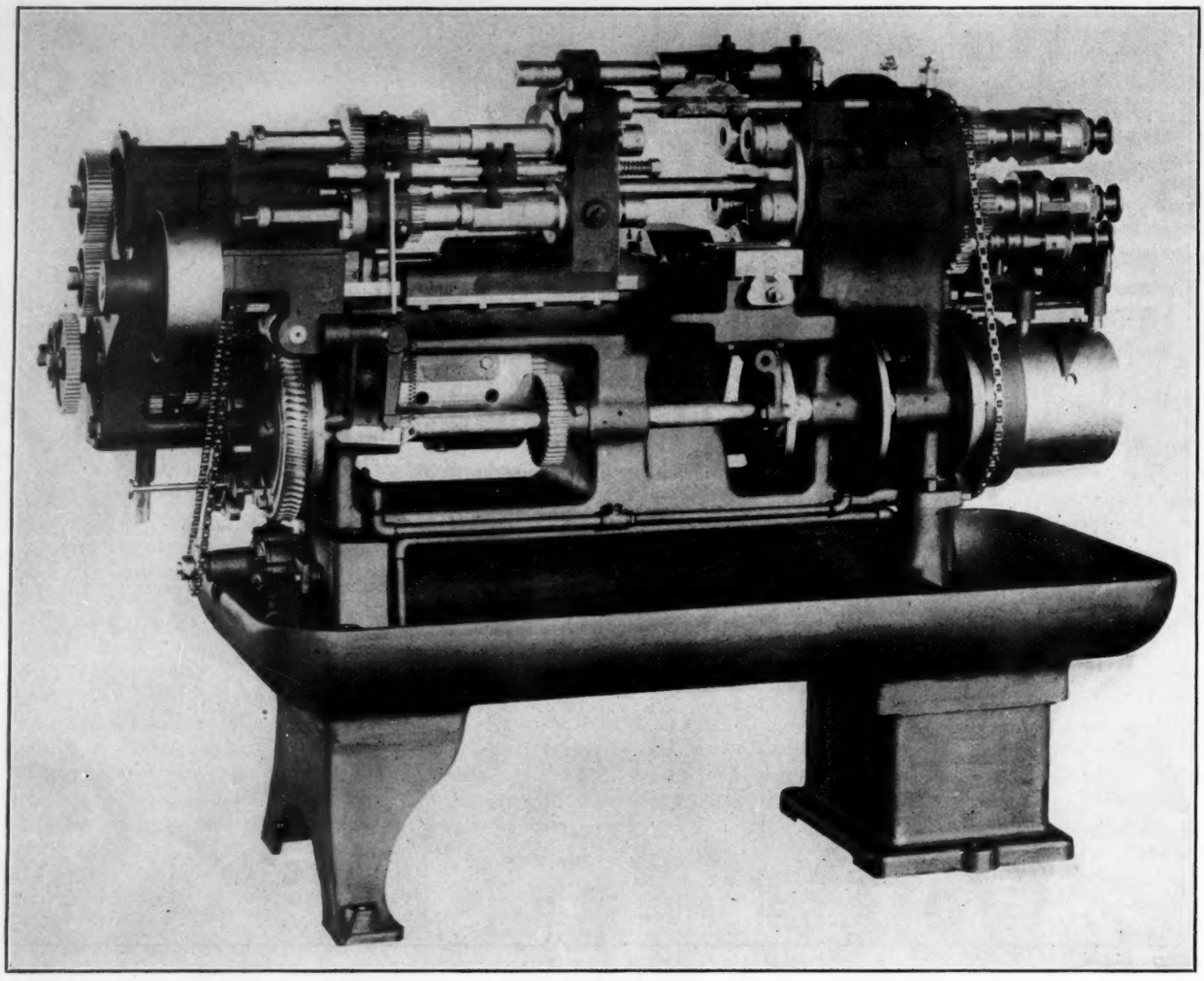


FIG. 2—REAR SIDE.

carrying four tools and the stock stop. Two of these tools may be threading tools, either taps, dies or one of each. An auxiliary tool holder journaled on a stud held in the spindle head cap and taking bearing in the longitudinal tool slide, operates in either the third or fourth spindle position. It is oscillated onto the work by a cam adjustably carried by a rod fastened to and moving with the longitudinal tool slide. A spring returns the auxiliary tool holder to its normal position. The tool holder and operating cam are plainly shown in Figs. 1 and 2.

The operation of the longitudinal tool slide, the threading spindles, the transversely moving tool slides, the spindle head locking and indexing mechanism, the stock feeding and chucking mechanism and the general construction of the stock spindles and the spindle carrying head are nearly identical with those of the automatic lathe previously described in these columns and need no further explanation. Gear guards were removed to permit a more detailed view of the mechanism.

CUSTOMS DECISIONS.

The board of the United States general appraisers at New York made the following decisions:

(1). That fish hooks, which were claimed dutiable at 3¼ cents per pound, were properly assessed by the collector of customs at 40 per cent under paragraph 137, act of 1897.

(2). That Swiss embroidery needles are dutiable at 25 per cent as "needles * * * not specially provided for" rather than $1 per 1,000 and 25 per cent under paragraph 165 as "needles for knitting and sewing machines."

(3). That tubing composed of inner steel tube and outer covering of woven iron wire is dutiable at 35 per cent under paragraph 152 of tariff as iron or steel tubes. The assessment was 45 per cent by the New York collector of customs.

The United States circuit court at Boston held that forged rifle barrels, rough bored, are dutiable as "rifles and parts thereof" at 25 per cent, under paragraph 157 of the Dingley act. The government contended throughout the litigation that the rifle parts were dutiable as "manufactures of metal not specially provided for'" at 45 per cent. It is not known at this time if the government will appeal to the circuit court of appeals or not. I. S. Riga is the importer in the case just decided.

The United States circuit court at New York held in the cases of Maldonado & Co. and others, that steel horseshoe calks and steel ball bearings are dutiable at 45 per cent under paragraph 193 as manufactures of metal. The importers' claims in both questions were that the goods are dutiable under paragraph 135 as "steel in all forms and shapes not especially provided for" at various lower rates per pound according to value.

Unsettled Condition of Market

Liquidating tendencies in the speculative stock market which were developed the previous week, culminated in striking declines on Monday. Recovery followed within a day or two, but dullness the remainder of the week was the only characteristic noted.

Monday, the reaction in the market ranged from one to five points on practically the entire list; the wheat market was firm. Tuesday there was moderate recovery in the New York market, but the close was unsettled. Prices made a strong rally Wednesday and closed firm; modifications of the proposed corporation income tax which would strip the proposal of its inquisitorial features were said to have been agreed upon. While the market was strong Thursday in the early dealings, trading was very dull; copper metal was firm, and some grades higher. The market Friday was dull and heavy, a few specialties being pushed to the front. Trading was nearly at a standstill Saturday, and price changes were insignificant.

Call money for the week ranged between 2 and 1½ per cent; the market continued easy under the influence of further liquidation of stocks and the continued inflow of currency from the interior. Time money was fairly easy and liberally offered. Gold to the amount of $1,600,000 was engaged for export to South America and Europe. The prospects for at least as good a crop of winter wheat as that of last year are foreshadowed by the early returns from the harvest fields in the southwest. The number of immigrants entering the United States through Ellis Island has fallen rapidly in the past month, the total report Saturday for the week being 15,932 as against the previous weekly averages of 25,000 to 30,000. Bank clearings in the United States for the week fell below the earlier weeks in the month, but exceeded the corresponding week last year by 48 per cent. The weekly statement of New York banks showed that the surplus now stands at $33,557,250, compared with $70,858,725 the corresponding week last year, and $10,328,075 the corresponding week two years ago. The actual report of clearing house banks showed loans decreased $12,063,800; deposits decreased $4,329,700; surplus increased $9,698,150, and the ratio of reserve, 27.7, an increase of 0.6. Non-member banks and trust companies showed loans increased $6,043,300; net deposits increased $4,041,500, and the percentage of reserve, 19.1, an increase of 0.3. Commercial failures for the week were 217, compared with 230 the previous week, and 282 the corresponding week last year. Shares were sold to the number of 3,645,865, compared with 4,875,811 the previous week, and 1,593,375 the corresponding week last year. Bonds, exclusive of government bonds, were sold to the amount of $23,520,000, compared with $26,183,000 the previous week and $8,628,000 the corresponding week last year.

THE LEADING INDUSTRIAL SECURITIES.

	Closing Quo. June 26	Changes in Week	Date Ann.	1909 M't'g.	Stock Outstanding	Dividend Basis	Dividend Last Declared	Dividend Date Last Div. Pay.
Allis-Chalmers	15⅛	— ¼	Sept.	2	$19,820,000		.....	.....
Allis-Chalmers, pr.	51⅜	— ¼			16,150,000	7 cum	1¾ Q.	Feb., 1904
American Can	11⅜	— ½	Feb.	2	41,233,300		.....	.....
American Can, pr.	80¼	—1½			41,233,300	7 cum	1¾ Q.	July, 1909
Am. Car & Foundry	56¼	+1	June	24	30,000,000		½ Q.	July, 1909
Am. Car.& Fdy., pr.	117	.....			30,000,000	7 n. c.	1¾ Q.	July, 1909
American Loc.	59⅝	+ ⅛	Oct.	19	25,000,000	5	1¼ Q.	Aug., 1908
American Loc., pr.	117¾	.....			25,000,000	7 cum	1¾ Q.	April, 1909
American Ship	60	— ⅛	Oct.	13	7,600,000	4	1 Q.	June, 1908
American Ship, pr.	109	.....			7,900,000	7 n. c.	1¾ Q.	Oct., 1908
Am. Steel Foundries(new).	48½	— ½	Dec.	2	17,184,000		.....	.....
Am. Steel Foundries, pr.	47½	.....			17,240,000	6 cum	1	Aug., 1904
Barney & Smith	30	.....	June	1	2,000,000	4	1 Q.	Sept., 1907
Barney & Smith, pr.	91	.....			2,500,000	8 cum	2 Q.	June, 1908
Bethlehem Steel	29½	+ ½	April	6	14,862,000		.....	.....
Bethlehem Steel, pr.	60	.....			14,908,000	7 n. c.	¾ Q.	Feb., 1907
Cambria Steel	41	+ ¼	March	16	45,000,000*	3	1½ S. A.	Feb., 1909
Cambria Iron	46¼	.....			8,468,000*	4	2 S. A.	Sept., 1908
Chicago Pneumatic Tool	23	—2½	Feb.	15	6,145,800	4	1 Q.	Oct., 1907
Colorado Fuel	43	+ ½	Oct.	18	34,235,500		3½	April, 1902
Crucible Steel	8¾	— ½	Oct.	20	24,578,400		.....	.....
Crucible Steel, pr.	70	— ¾			24,436,500	7 cum	1 Q.	Mar., 1909
Empire Steel	8½	+3½	April	27	1,254,770		.....	.....
Empire Steel, pr.	60	+2			2,500,000	6 cum	3 S. A.	July, 1909
Fay & Egan	90	.....	Feb.	18	1,000,000	7	1¾ Q.	Nov., 1908
Fay & Egan,pr.	125	.....			1,000,000	7 cum	1¾ Q.	May, 1909
General Electric	161½	+ ½	May	11	65,178,800	8	2 Q.	July, 1909
Harbison-Walker	20	+ ¼	Jan.	18	18,000,000		½	Oct., 1907
Harbison-Walker, pr.	85⅝	+ ⅝			9,600,000	6 cum	1½ Q.	April, 1909
International Pump	39½	— ¼	June	8	17,762,500		1	April, 1905
International Pump, pr.	87½	+ ⅜			11,350,000	6 cum	1½ Q.	May, 1909
Lackawanna Steel	47	.....	March	10	34,971,400		.....	.....
Lake Sup. Corp.	23½	—1	Oct.	6	40,000,000		.....	.....
New York Air Brake	87	—1	June	17	8,012,500	8	2 Q.	Oct., 1907
Niles-Bement-Pond	100	.....	Feb.	3	8,500,000	3	1½ Q.	June, 1909
Niles-Bement-Pond, pr.	100	.....			2,000,000	6 cum	1½ Q.	May, 1909
Otis Elevator Co.	57	.....	March	15	6,375,300		1½ S. A.	April, 1909
Otis Elevator Co., pr.	98	— ½			6,295,000	3 n. c.	1½ Q.	July, 1909
Penn Steel	50	.....	May	10	10,750,000		.....	.....
Penn. Steel, pr.	109	—1			16,500,000	7 n. c.	3½ S. A.	May, 1909
Pittsburg Coal Co.	11	—2	March	9	28,104,600		.....	Nov., 1906
Pittsburg Coal Co., pr.	50	.....			27,071,800	7 c.	1¾	April, 1905
Pressed Steel Car	42¾	+ ¾	Feb.	17	12,500,000		3	Aug., 1904
Pressed Steel Car, pr.	102¼	—1½			12,500,000	7 n. c.	1¾ Q.	May, 1909
Pullman	189	—1	Nov.	10	100,000,000	8	2 Q.	May, 1909
Railway Stl. Spring	43	— ⅛	March	4	13,500,000	2	1 S. A.	Oct., 1908
Railway Stl. Spring, pr.	105	.....			13,500,000	7 cum	1¾ Q.	July, 1909
Rep. Iron & Steel	31	+ ¾	Oct.	20	27,191,000		.....	.....
Rep. Iron & Steel, pr.	104¼	—2¾			20,416,900	7 cum	1¾ Q.	July, 1909
Sloss-Sheffield	82	.....	March	10	10,000,000	5	1¼ Q.	June, 1909
Sloss-Sheffield, pr.	115⅜	—1⅜			6,700,000	7 n. c.	1¾ Q.	July, 1909
U. S. Pipe & Fdy.	33¼	.....	June	23	12,500,000	2	½ Q.	Dec., 1907
U. S. Pipe & Fdy, pr.	85	+ ¾			12,500,000	7 n. c.	1¾ Q.	Sept., 1908
U. S. Steel	66½	— ¼	April	19	508,302,500	2 n. c.	½ Q.	June, 1909
U. S. Steel, pr.	123¾	.....			360,281,100	7 cum	1¾ Q.	June, 1909
U. S. Steel, 5s	105½	+ ¼			463,798,000	5	5 A.	.....
Va. Iron, Coal & Coke	62	— ½	Sept.	21	9,073,680		.....	.....
Westinghouse Elec.	85	—1⅜	June	16	27,173,200	10	2½ Q.	April, 1909
Westinghouse Air Brake	110	—5	Oct.	5	14,000,000*		2½ Q.	Oct., 1907

Par value of shares, $100, except those starred (*), $50.

Copper Stocks.

New York.—Amalgamated Copper closed 81½, a net loss of ⅛.

Boston.—Butte Coalition closed 25¼, a net loss of ¼; Calumet & Arizona closed 104, no change; Calumet & Hecla closed 655, a net gain of 3; Quincy Mining closed 89, a net loss of 2; North Butte Mining closed 57¼, a net gain of ¼.

Financial Notes.

The Union Switch & Signal Co. declared the regular quarterly dividends of 3 per cent on preferred and common stocks, payable July 10; the American Locomotive Co., the regular quarterly dividend of 1¾ per cent on preferred, payable July 21; Manning, Maxwell & Moore, Inc., the regular quarterly dividend of 1½ per cent, payable July 1; the American Ship Building Co., the regular quarterly dividend of 1¾ per cent on preferred, payable July 15.

The Hamilton furnace of the Hanging Rock Iron Co., Hanging Rock, O., went out of blast June 19.

NEWS FROM MANY INDUSTRIES

New Buyers:—

Articles of incorporation have been filed by the Ajax Wrench Co., Toledo, O., capitalized at $10,000. William Harrop, Frank Gorman, M. S. Smith, T. E. Lynn and R. B. Wilson are the incorporators.

Ledbetter, Carpenter & Exeter, Fort Dearborn building, Chicago, have incorporated Mulherin & Co., to manufacture engines and fittings, with $2,500 capital stock.

The McMillan Pump, Power & Mfg. Co., Kansas City, Mo., with $25,000, has been incorporated by Milton McMillan, Daniel E. Bird, Benjamin F. Rounds and others.

A charter has been granted to the Walking Wheel Co., Chicago, 416 Fisher building, to manufacture machinery, with an authorized capital of $20,000.

The Illinois Pump & Brass Co., Peoria, Ill., has been incorporated with $15,000 capital stock, by C. L. Wilkins, F. P. Wyne and E. D. McCulloch.

The Perfection Metal Tie Co., Terre Haute, Ind., has been granted a certificate of incorporation. The capital stock is placed at $20,000, and the incorporators are B. H. Pinnell, R. D. Robertson and W. H. Mayer.

The Unique Mfg. Co., Chicago, has applied for a charter to engage in the manufacture of tools and implements, with a capital of $100,000. Morgan & Rubinstein, 79 Dearborn street, Chicago, are the incorporators.

The Marine Power Syndicate, New York City, has been incorporated by Harmon S. Graves, Robert M. Miles, Jr., and Charles S. Yowger, 27 Pine street, New York City. The company has an authorized capital of $500,000 and will manufacture power machinery.

A. Van Vechten & Son, New York City, manufacturing hardware, machinery, mill and factory supplies, etc., with $1,000 capital stock, has been incorporated by A. Van Vechten and Robert C. Van Vechten, 1117 Mary street, Elizabeth, N. J., and Frank J. Bloomer, Bath Beach, N. Y.

Coplen, Kidder & Hegel Mfg. Co., St. Louis, has been incorporated to deal in machinery, boilers and supplies. Those interested are Daniel G. Kidder, Elbert M. Coplen and Kate Hegel. The capital is $250,000, fully paid.

The Muskogee Iron Works, Muskogee, Okla., has been chartered with $50,000 capital stock by George S. Wilson, E. F. Mathey, B. W. Rueppe and C. A. Mathey, of Muskogee; C. L. N. Haines and E. S. Long of Aurora, Ill., and H. W. Lay, of St. Louis.

The Foster Machine Co., Elkhart, Ind., has filed application for a charter for a term of 50 years, with an authorized capital of $25,000. The company will manufacture and sell machinery, and has these incorporators: W. Harry Foster, Marion E. Brady and Edward B. Zigler.

The Corrugated Expanded Metal Corporation, New York City, manufacturing building material, etc., with $25,000 capital stock, has filed articles of incorporation through Jacob Loberman, 55 West Sixteenth street, Harry C. Magnus, 130 Fulton street; Carl W. Stern, 24 State street, all of New York City.

The Williams Bridge Co., Syracuse, N. Y., has applied for a charter to build bridges, structural work, etc., with $20,000 capital stock. The incorporators are William W. Williams, Syracuse, N. Y.; Frank J. Tanner, Groton, N. Y., and James B. French, Jamaica, N. Y.

A certificate of incorporation has been granted to the W. C. Clark Safe Co., New York City, manufacturing safes, vaults, time locks, etc., with $25,000 capital stock. Those interested are Ad. Fashay, 49 Pulaski street, Brooklyn; Herman Goldman, 50 East Eighty-sixth street; Frank Bisch, 2707 Eighth avenue, New York City, and others.

A charter has been granted to Olin, Giberson & Hilands, New York City, to deal in steel and iron tubular wares, water, gas and steam supplies, plumbing and steam fitting materials, with $3,000 capital stock. The incorporators are Frank E. Olin, 587 Riverside Drive, New York City; Eugene D. Giberson, Westfield, N. J., and John P. Hilans, 882 Union street, Brooklyn, N. Y.

The Means Engineering & Foundry Co., Toronto, has been incorporated with $50,000 capital stock. The incorporators include Thomas Price, J. R. Gilchrist, W. B. Goucher, George R. Wilson, A. G. White.

The Cleveland Roofing Nail Co., Cleveland, has been chartered by L. L. Norman, G. B. Riley, A. M. McGee, J. R. McQuigg, H. H. Kuckle, and A. H. Mills, with $10,000 capital stock.

The Ohio Metal Products Co., Dayton, O., has been incorporated by J. A. Dohner, C. E. Muhlenberg, B. E. Dohner and E. Muhlenberg, with $30,000 capital stock.

A charter has been granted to the Early Sun Stove & Range Co., Newark, O., capitalized at $20,000. Those interested include C. F. Dean, C. E. Ludy, G. A. Wise, A. J. Mathias, C. W. McAdams.

The Monarch Machine Co., Sidney, O., has been granted a charter with $50,000 capital stock. I. H. Thedieck, J. O. Ames, E. E. Kah and W. H. Wagner are the incorporators.

The Badger Motor Car Co., Columbus, Wis., with $100,000 capital stock, has been incorporated by E. W. Abrogast, W. C. Leitsch, George C. Holtz, A. M. Bellack and E. M. Poser.

Articles of incorporation were filed for the Louisville Brazing & Machine Co., of Pittsburg, at Dover, Del., to manufacture machinery. The incorporators are Fred C. Tygard, George R. Tygard and James W. Tygard, of Pittsburg. The capital stock is $15,000.

The McWane Tidewater Pipe Co., of Norfolk, Va., has been incorporated with a minimum capital of $300,000 and a maximum of $400,000. The officers are: President, H. E. McWane; vice president, F. S. Kirkpatrick; secretary-treasurer, W. W. Coffey, all of Lynchburg, Va. Messrs. McWane and Kirkpatrick are president and vice president respectively of the Lynchburg Foundry Co., which had been mentioned as planning to build a cast iron pipe plant at Norfolk. This plant will be built by the new company.

New Construction:—

The Muskegon Boiler Works, Muskegon, Mich., has begun the construction of an addition 75 x 100 feet to its plant.

P. N. Sharpless, West Chester, Pa., is preparing to build an addition to the foundry attached to the Sharpless Separator Works.

The Buffalo Brass & Copper Mill, 446 Military road, Buffalo, has taken out a building permit for a one-story brick addition to cost $8,000.

The Snow Steam Pump Works, Buffalo, is planning to build a storage warehouse 45 x 84 feet on the east side of Roberts avenue, near the plant site.

Ground has been broken by the American Car & Foundry Co., at Berwick, Pa., for an addition 52 x 930 feet to its steel passenger car department. The addition will double the

capacity of that department.

The Arkansas Foundry Co., Little Rock, Ark., which was recently incorporated with a capital of $25,000, is constructing a building on East Fourth street, 100 x 140 feet. The company expects to be ready for business early in July.

Several manufacturers have secured leases to sites on the tide lands at Tacoma, Wash., including the Enterprise Brass Foundry, which will erect a building 30 x 40 feet, and the Pacific Pattern Works, which will build a shop 60 x 132 feet.

The work of rebuilding the plant of the British-Canadian Smelters Co., at Chippewa, Ont., is being so rapidly carried along that it is expected that the plant will be ready for operating in August. The old plant was burned down some months ago.

The El Reno Foundry & Machine Co., Inc., El Reno, Okla., advises respecting an addition to its foundry that it will be 60 x 72 feet, fire proof construction, equipped with a new cupola, traveling crane and electrically-driven cupola blower and a number of rattler boxes.

Thomas Brennan, formerly an employe of the Keystone Steel Casting Co., has begun the construction of a steel casting plant at Chester, Pa., near Second and Booth streets. The foundations have been laid for the plant, and some of the equipment is on the ground.

The Shirley Radiator & Foundry Co., Shirley, Ind., is preparing to enlarge its capacity because of increased business. At first the company simply manufactured radiators, but now it is building heating plants, including boilers of both large and small dimensions.

The Heany Lamp Co., York, Pa., is building machinery which will be installed in the company's proposed new light plant at Flint, Mich. The company is considering plans for a new light factory to be located in York, upon which the board of directors will be asked to act shortly.

The Steam Engineering & Construction Co., 9 Center street, Detroit, advises respecting its recent incorporation that it is a construction company for the purpose of installing its own improved system of underground distribution. In this work it will be necessary to have special fittings designed for the parts which it is now manufacturing.

The Oregon Foundry & Machine Co., Oregon, Ill., advises relative to proposed new construction that an extension is being built in its machine shop, 40 x 107 feet, to be used for a finishing department for piano plates. Nothing in the way of equipment will be required that the company does not make itself, except a little shafting and a few pulleys.

The Waukesha Motor Co., Waukesha, Wis., is building an addition to its present factory, which will increase its capacity 2,000 motors a year. The factory will be 100 x 150 feet, with saw tooth roof, construction to be of steel, concrete and brick. Its location is on the main lines of the Chicago, Milwaukee & St. Paul railroad and the Chicago & Northwestern. Its office building will be 20 x 40 feet. The entire plant will be heated by forced draft.

The Fox Mfg. Co., Brooklyn, Wis., has found that its business has assumed such proportions that it is necessary to increase its capital stock and to erect new buildings. It has arranged for a location near Madison, Wis., where it will build its plant and will do its manufacturing in the future. Its business has increased about 50 per cent in the past three years. A considerable proportion of the new stock will be taken by the present stockholders, and the remainder placed upon the market.

The Republic Iron & Steel Co. has announced that the Williams bar mill at the Brown-Bonnell plant at Youngstown will be torn out and replaced by a new 20-inch skelp mill. The contract for the rolls and housings has been let to the United Engineering & Foundry Co. The Southwark Engine Co., Philadelphia, has delivered the engine to drive the mill. It is proposed that the new 10-inch mill which will be erected on the site of the straightening shed, now being razed, will work skelp iron exclusively.

The Syracuse Aluminum & Bronze Co., 530 Leavenworth avenue, Syracuse, N. Y., advises respecting its new foundry that it will contain approximately 60,000 square feet, and will be equipped with everything necessary for the production of aluminum bronze and brass castings—particularly aluminum—at the least possible cost. The idea with which the plant is being constructed is that it will enable the company to produce castings for the least possible money and at a liberal expenditure for the first plant cost in order to bring this about.

The Martin Metal Mfg. Co., Wichita, Kans., which has increased its capital stock from $50,000 to $75,000, is erecting a new building at the corner of Second street and Mousley avenue, two stories, with basement, 140 x 160 feet. About $10,000 worth of extra machinery will be installed in the new building, for the manufacture of sheet metal into specialties such as eave troughs, metal ceilings, galvanized tanks, etc. The officers are: President, Edward Hockaday, Kingfisher, Okla.; vice president, J. R. Mead; secretary, I. N. Hockaday; treasurer and general manager, F. W. Martin.

Tenders are being received by the Puget Sound Iron & Steel Works, Tacoma, Wash., which is being designed by I. J. Knapp. The foundry will be 90 x 126 x 50 feet in dimensions, equipped with a 40-foot traveling crane, of 50 tons capacity. The machine shop will be 70 x 250 x 50 feet, equipped with a similar crane. The pattern shop will be two stories, 50 x 150 feet; the forge shop 70 x 90 feet, equipped with an electric traveling crane, 25 tons capacity; storage house, 50 x 80 feet; and the office building two stories, 30 x 40 feet. It is expected that the plant will cost ultimately $100,000. It is being erected on tide lands between Canal street and the Puyallup river. It is to be ready for operating in 12 months.

General Industrial:—

The McMonigal Furnace Co., Columbus, O., has increased its capital stock from $10,000 to $30,000.

Deere & Mansur Co., Moline, Ill., has increased its capital stock from $1,200,000 to $2,500,000.

The American Foundry Co., Indianapolis, has filed through Secretary Charles L. Bieler, notice of an increase of capital stock from $16,000 to $26,000.

The McClintic-Marshall Construction Co., of Pittsburg, has received the contract for the fabrication of 375 tons of steel for the Calhoun hotel in Seattle, at Second and Virginia streets.

The Chicago Iron Store Co., Inc., Chicago, heavy hardware, advises respecting its recently noted increase of capital stock, that it is not the company's intention to make any improvements in equipment at the present time.

The receiver's auction sale of the Portsmouth Forge plant, Portsmouth, N. H., resulted in the real state being sold to Edward B. Kimball, for $17,000. There was lively bidding among the 12 bidders for the real estate.

The Millard F. Wilfong Iron Works, Philadelphia, advises as to its recently noted incorporation that it plans to manufacture along similar lines as heretofore. No extensions to buildings or additional equipment is contemplated at present.

A license has been issued to the

Dominion Iron Works, a corporation organized under the laws of Tennessee, to do business in Virginia. John W. Price, of Bristol, has been named statutory agent. The maximum capital authorized by the charter is $50,000.

The Iron Crib & Bin Co., Wooster, O., whose incorporation was recently noted, advises that it is beginning business on a modest scale, but expects to be doing a fair amount of business next year. For that reason, no new construction will be undertaken this year.

The American Iron & Metal Co., Kalamazoo, Mich., whose warehouse was recently damaged by fire, advises that it is not at the present time considering rebuilding, since it has ample warehouse facilities to care for its business without additional construction.

The Stobel Steel Construction Co., Chicago, has been awarded the contract for the construction of the approaches and steel work of a new bridge to be erected by the city of Philadelphia over the Schuylkill river at Passyunk avenue. The Stobel company's bid was $313,000.

At the annual meeting of the Westinghouse Machine Co., recently, the following directors were re-elected: H. M. Breckenridge, H. C. Bughman, J. D. Callery, J. D. Lyon, William McConway, Horace E. Smith, John F. Wallace, George Westinghouse and H. H. Westinghouse. Reports of operations showed that the volume of business in recent months had become almost normal. Substantial increases in orders were reported in the past six months, including units of large size.

The United States district court has made an order discharging from bankruptcy the Oswego Boiler & Engine Co., Oswego, N. Y. The plant is now under the control of F. W. Sweetland, as trustee, although the Oswego Boiler & Engine Co. is the nominal owner. Mr. Sweetland holds the assignment of all claims against the company, aggregating $55,000. Oswego capitalists have advanced additional capital to start the concern on what is believed to be a successful career for the future.

The Crocker-Wheeler Co., Ampere, N. J., notes among other recent sales the following: One 150-kilowatt 125-volt generator to the Keystone Steel & Wire Co.; two 110-horsepower, 230-volt direct connected motors to the Illinois Steel Co., at South Chicago; a number of crane motors amounting to 247 horsepower in 220-volt direct connected series wound, to the Northern Engineering Works, at Detroit; a 102-horsepower, 220-volt direct connected motor to the Central Iron & Coke Co., Holt, Ala.

The Cutler-Hammer Mfg. Co., of Milwaukee, has announced that it has purchased the plant, business and patents of the J. L. Schureman Co., of Chicago. The manufacture of the Schureman controlling apparatus will be continued. For the present orders and inquiries are received by the firm at the old address, 70 West Jackson boulevard, Chicago. S. M. McFedries, general manager of the Schureman company, is retained by the Cutler-Hammer Co., and will remain in charge of the manufacture and sale of the Schureman apparatus.

The Yost Gearless Motor Co., Springfield, O., advises that there will be no material change in the company, following its recent incorporation. It expects to continue the manufacture of the Yost gearless motor washer as heretofore. No additional building is contemplated for the present, as the factory equipment is able to care for a considerable increase in the output. The president and treasurer of the company is William Hope, and the secretary and manager is George L. Miller. The company reports that it finds business very good, and that future prospects are encouraging.

Trade Notes:—

Patterson, Gottfried & Hunter, Ltd., are sending out a tastefully illustrated circular on "Our New Home," 211-215 Center street and 147-151 LaFayette street, New York City.

The Wisconsin Bridge & Iron Works, Milwaukee, Wis., has opened a branch office in the New York building, Seattle. The office will have charge of the company's business in the north Pacific coast territory. C. W. Brooks is manager of the Seattle office.

Fires:—

The loss on the shops of the Missouri, Kansas & Texas railroad at Denison, Tex., June 17, is estimated at $150,000.

The plant of the Crown Drill Co., Phelps, N. Y., manufacturing grain drills, was badly damaged, June 19, the loss being placed at $60,000.

A fire starting near the cupola of the foundry of Hart & Crouse Co., Utica, N. Y., June 11, damaged the plant to the extent of several hundred dollars.

The plant of the Duisdieker Foundry & Mfg. Co., Pekin, Ill., was damaged to the extent of probably $2,000, June 17, by a fire starting in a pile of flasks stacked against a wall. Both the machine shop and the foundry were damaged.

The Robesonia Iron Co., Ltd., suffered a loss of about $10,000 partially covered by insurance, by a fire, June 17, which destroyed a round house at Robesonia, Pa., in which the yard shifting engines were housed. One engine was entirely destroyed and the other was damaged.

The machine shop of Martin Gable, as well as the machine shop of Knobel & Kappa Co., Louisville, Ky., together with other industrial plants, were damaged June 13. The loss on the Gable shop will amount to about $1,500 and to the Knobel & Kappa company about $1,000.

The Modern Machine Works plant at St. Johns, Ore., owned by Bennet & Murphey, was damaged to the amount of about $6,000, June 11.

TRADE PUBLICATIONS.

AIR COMPRESSORS—The Gardner Governor Co., Quincy, Ill., in Bulletin 143, describes the Gardner-Rix vertical high speed, single-acting compressor designed for driving either by belt or by direct connection to electric motor, steam or gas engines. The machines are built either single or duplex, and the bulletin includes table of sizes, capacities, dimensions and weights.

FOUNDRY COKE—A very neat little 52-page booklet by the Graceton Coke Co. draws attention to the merits of Graceton foundry coke. Tests, analyses and comparisons with other cokes, are given, and letters from prominent concerns reporting their experiences, are included, together with considerable information as to cupola practice and miscellaneous recipes for foundrymen.

MACHINERY AND MACHINE TOOLS—The Cincinnati Iron & Steel Co. has issued a 72-page, 4 x 6½-inch catalog of machinery and equipment for structural, boiler, machine, sheet metal and other shops.

SCREW SPIKES—The Spencer Otis Co., Railway Exchange building, Chicago, has issued a booklet with the above title, describing screw spikes and the methods of application, and including comparisons of holding powers of the screw and ordinary types.

MILLED SCREWS—The National-Acme Mfg. Co., Cleveland, has issued a 32-page catalog of milled screws in various forms, including set, cap and collar screws; studs, coupling bolts, etc.

ELECTRICAL SUPPLIES—In a 98-page, 6 x 9-inch catalog entitled "Malleable Pole and Line Hardware," the St. Louis Malleable Casting Co. describes a large variety of electrical specialties for line construction for all classes of service.

ELECTRICAL APPARATUS—Circular No. 1502, issued by the Westinghouse Electric & Mfg. Co., contains information on alternating current distribution covering transformers, lightning arresters, insulators, cross arms, underground and overhead construction applicable to both congested and scattered districts, etc. There is also given information on potential regulating systems.